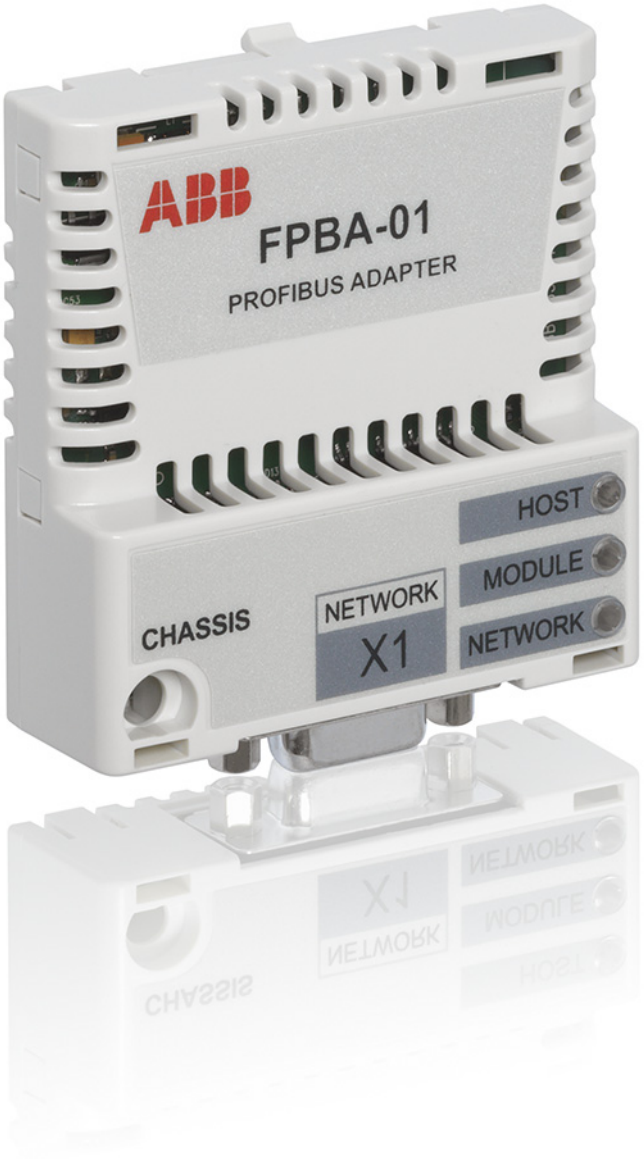
ABB fieldbus options

User's manual
FPBA-01 PROFIBUS DP adapter module



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List of related manuals

See section *Related manuals* on page *16*.

User’s manual

FPBA-01 PROFIBUS DP adapter module

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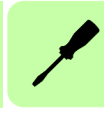
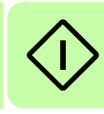
5. Electrical installation 

6. Start-up 

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1

Safety

What this chapter contains

The chapter presents the warning symbols used in this manual and the safety instructions which you must follow when installing an optional module into a drive, converter or inverter. If ignored, physical injury or death may follow, or damage may occur to the equipment. Read this chapter before you start the installation.

Use of warnings

Warnings caution you about conditions which can result in serious injury or death and/or damage to the equipment and advise on how to avoid the danger. The following warning symbols are used in this manual:

Electricity warning warns of hazards from electricity which can cause physical injury and/or damage to the equipment.

General warning warns about conditions, other than those caused by electricity, which can result in physical injury and/or damage to the equipment.

Safety in installation

These warnings are intended for all who install an optional module into a drive, converter or inverter.

WARNING! Ignoring the following instructions can cause physical injury or death, or damage to the equipment.

- Only qualified electricians are allowed to install and maintain the drive, converter or inverter!
- Disconnect the drive, converter or inverter into which the module will be installed from all possible power sources. After disconnecting, always wait for 5 minutes to let the intermediate circuit capacitors discharge before you proceed.
- Always ensure by measuring with a multimeter (impedance at least 1 Mohm) that:
  - there is no voltage between the input power terminals of the drive, converter or inverter and the ground
  - there is no voltage between the output power terminals of the drive, converter or inverter and the ground.
- Do not work on the control cables when power is applied to the external control circuits of the drive, converter or inverter. Externally supplied control circuits may carry dangerous voltage.

2

About the manual

What this chapter contains

This chapter introduces this manual.

Applicability

This manual applies to the FPBA-01 PROFIBUS DP adapter module (+K454), SW version 2.143 or later.

Compatibility

The FPBA-01 PROFIBUS DP adapter module is compatible with the following drives:

- ACS355
- ACSM1
- ACS850
- ACQ810
- ACS880.

The FPBA-01 PROFIBUS DP adapter module is compatible with all master stations that support the PROFIBUS DP-V0 and DP-V1 protocols.

Target audience

The reader is expected to have a basic knowledge of the fieldbus interface, electrical fundamentals, electrical wiring practices and how to operate the drive.

Purpose of the manual

The manual provides information on installing, commissioning and using an FPBA-01 PROFIBUS DP adapter module.

Related manuals

The related manuals are listed below.

	Code (English)
Drive user's manuals	
ACS355 drives (0.37…22 kW, 0.5…30 hp) user's manual	*3AUA0000066143*
Drive hardware manuals and guides	
ACSM1-204 regen supply modules (5.3 to 61 kW) hardware manual	*3AUA0000053713*
ACSM1-04 drive modules (0.75 to 45 kW) hardware manual	*3AFE68797543*
ACSM1-04 drive modules (55 to 110 kW) hardware manual	*3AFE68912130*
ACSM1-04Lx liquid-cooled drive modules (55 to 160 kW) hardware manual	*3AUA0000022083*
ACS850-04 (0.37…45 kW) hardware manual	*3AUA0000045496*
ACS850-04 (55…160 kW, 75…200 hp) hardware manual	*3AUA0000045487*
ACS850-04 (200…500 kW, 250…600 hp) hardware manual	*3AUA0000026234*
ACQ810-04 drive modules (0.37…45 kW, 0.5…60 hp) hardware manual	*3AUA0000055160*
ACQ810-04 drive modules (55 to 160 kW, 75 to 200 hp) hardware manual	*3AUA0000055161*

	Code (English)
ACQ810-04 drive modules (200…400 kW, 250…600 hp) hardware manual	*3AUA0000055155*
ACS880-01 (0.55 to 250 kW, 0.75 to 350 hp) hardware manual	*3AUA0000078093*

Drive firmware manuals and guides

ACSM1 motion control program firmware manual	*3AFE68848270*
ACSM1 speed and torque control program firmware manual	*3AFE68848261*
ACSM1 regen supply control program firmware manual	*3AUA0000052174*
ACS850 standard control program firmware manual	*3AUA0000045497*
ACQ810 standard pump control program firmware manual	*3AUA0000055144*
ACS880 primary control program firmware manual	*3AUA0000085967*

Option manuals and guides

FPBA-01 PROFIBUS DP adapter module user's manual	*3AFE68573271*

You can find manuals and other product documents in PDF format on the Internet. See section *Document library on the Internet* on the inside of the back cover. For manuals not available in the Document library, contact your local ABB representative.

Before you start

It is assumed that the drive is installed and ready to operate before you start the installation of the adapter module.

In addition to conventional installation tools, have the drive manuals available during the installation as they contain important information not included in this manual. The drive manuals are referred to at various points of this manual.

Contents

The manual consists of the following chapters:

- *Safety* presents the safety instructions which you must follow when installing a fieldbus adapter module.
- *About the manual* introduces this manual.
- *Overview of the PROFIBUS network and the FPBA-01 module* contains a short description of the PROFIBUS network and the adapter module.
- *Mechanical installation* contains a delivery checklist and instructions on mounting the adapter module.
- *Electrical installation* contains instructions on cabling, connecting the module to the PROFIBUS network and bus termination.
- *Start-up* presents the steps to take during the start-up of the drive with the adapter module and gives examples of configuring the master system.
- *Communication profiles* describes the communication profiles used in the communication between the PROFIBUS network, the adapter module and the drive.
- *Communication protocol* describes the PROFIBUS messaging used in the communication with the drive and in PROFIBUS slave device configuration messages.
- *Diagnostics* explains how to trace faults with the status LEDs on the adapter module.

- *Technical data* contains the technical data of the adapter module and the PROFIBUS link.
- *Appendix A – PROFIdrive parameters* contains a list of the PROFIdrive parameters.
- *Appendix B – I&M records* contains the telegram and response structures for Identification & Maintenance records.

Terms and abbreviations used in this manual

General terms and abbreviations

Term/abbreviation	Explanation
Communication module	Communication module is a name for a device (eg, a fieldbus adapter) through which the drive is connected to an external communication network (eg, a fieldbus). The communication with the module is activated with a drive parameter.
Command word	See Control word.
Control word	16-bit word from master to slave with bit-coded control signals (sometimes called the Command word).
FPBA-01 PROFIBUS DP adapter module	One of the optional fieldbus adapter modules available for ABB drives. FPBA-01 is a device through which an ABB drive is connected to a PROFIBUS network.
Parameter	Operating instruction for the drive. Parameters can be read and programmed with the drive control panel, drive PC tools or through the adapter module.
PLC	Programmable logic controller
Profile	Adaptation of the protocol for certain application field, for example, drives. In this manual, drive-internal profiles (eg, DCU or FBA) are called native profiles.
Status word	16-bit word from slave to master with bit-coded status messages

PROFIBUS terms

Term	Explanation
Acyclic communication	Communication in which messages are sent only once on request
Array	Parameter consisting of data fields of equal data type
Broadcast	Non-acknowledged message from master to all bus participants (compare Multicast)
Cyclic communication	Communication in which parameter/process data objects are sent cyclically at predefined intervals
Drivecast	Broadcast and Multicast, a special message frame for drives
Fault	Event that leads to tripping of the device
GSD file	ASCII-format device description file in a specified form. Each different slave type on the PROFIBUS network needs to have its own GSD file.
Index	Access reference for objects in PROFIBUS
Master	Control system with bus initiative. In the PROFIBUS terminology, master stations are also called active stations.
Multicast	Non-acknowledged message from master to one group of bus participants (compare Broadcast)
Name	Symbolic name of a parameter
Parameter	Value that can be accessed as an object, eg, variable, constant, signal
Parameter number	Parameter address
Parameter/Process	Special object that contains parameter and process
Data object	Special object that contains parameter and process data

Term	Explanation
Process data	Data that contains Control word and reference value or Status word and actual value. May also contain other (user-definable) control information.
Request label	Coded information specifying the required service for the parameter part sent from master to slave
Response label	Coded information specifying the required service for the parameter part sent from slave to master
Slave	Passive bus participant. In the PROFIBUS terminology, slave stations (or slaves) are also called passive stations. Also referred to as node.
Warning	Signal caused by an existing alarm which does not lead to tripping of the device

PROFIBUS abbreviations

The text in *italics* is the original German term.

Abbreviation	Explanation
ACT	Actual value *Istwert*
AK	Request label/Response label *Auftragskennung/Antwortkennung*
DP	Decentralised Periphery *Dezentrale Peripherie*
DP-V0	PROFIBUS DP extension to the EN 50170 standard, providing the basic functionality of DP, including cyclic data exchange
DP-V1	PROFIBUS DP extension to the EN 50170 standard, including, eg, acyclic data exchange
FMS	Fieldbus Message Specification
ISW	See ACT.

Abbreviation	Explanation
PA	Process Automation *Prozessautomatisierung*
PD	Process data *Prozessdaten*
PKE	Parameter identification *Parameter-Kennung*
PKW	Parameter identification value *Parameter-Kennung-Wert*
PNU	Parameter number *Parameternummer*
PPO	Parameter/Process data object *Parameter-/Prozessdaten-Objekt*
PWE	Parameter value *Parameter-Wert*
PZD	See PD.
PZDO	Process data object *Prozessdatenobjekt*
SAP	Service access point
SOW	Reference *Sollwert*
SPM	Request signal *Spontanmeldung*
STW	Control word *Steuerwort*
ZSW	Status word *Zustandswort*

3

Overview of the PROFIBUS network and the FPBA-01 module

What this chapter contains

This chapter contains a short description of the PROFIBUS network and the FPBA-01 PROFIBUS DP adapter module.

PROFIBUS network

PROFIBUS is an open serial communication standard that enables data exchange between all kinds of automation components. There are three main variations of PROFIBUS:

- PROFIBUS FMS (Fieldbus Message Specification)
- PROFIBUS DP (Decentralised Periphery)
- PROFIBUS PA (Process Automation).

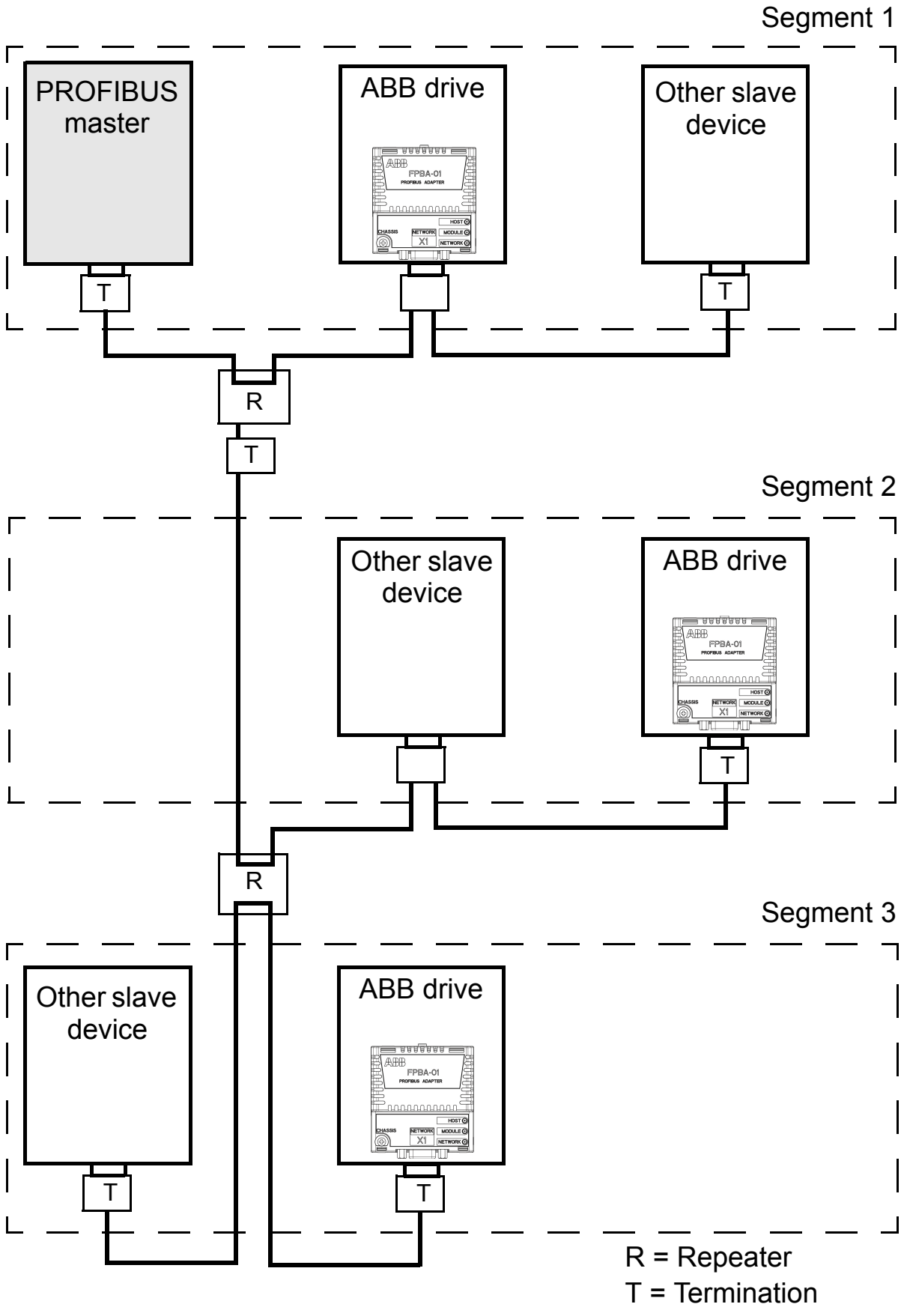
The physical transmission medium of the bus is a twisted pair cable (according to the RS-485 standard). The maximum length of the bus cable is 100 to 1200 meters, depending on the selected transmission rate (see chapter *Technical data*). Up to 32 nodes can be connected to the same PROFIBUS network segment without the use of repeaters. With repeaters, it is possible to connect 126 nodes (including repeaters and a master station) to the network.

In PROFIBUS communication, the master station – usually a programmable logic controller (PLC) – polls the nodes which respond and take the actions requested by the master. It is also possible to send a command to several nodes at the same broadcast; in this case the nodes do not send a response message to the master.

The PROFIBUS protocol family is specified in the IEC 61158 standard. The communication with a drive is defined in *PROFIdrive-PROFILE – The PROFIBUS Profile for Adjustable Speed Drives*. For further information on PROFIBUS, refer to the above-mentioned standard.

Example topology of the PROFIBUS link

An example of an allowable topology is shown below.



FPBA-01 PROFIBUS DP adapter module

The FPBA-01 PROFIBUS DP adapter module is an optional device for ABB drives which enables the connection of the drive to a PROFIBUS network. The drive is considered a slave on the PROFIBUS network.

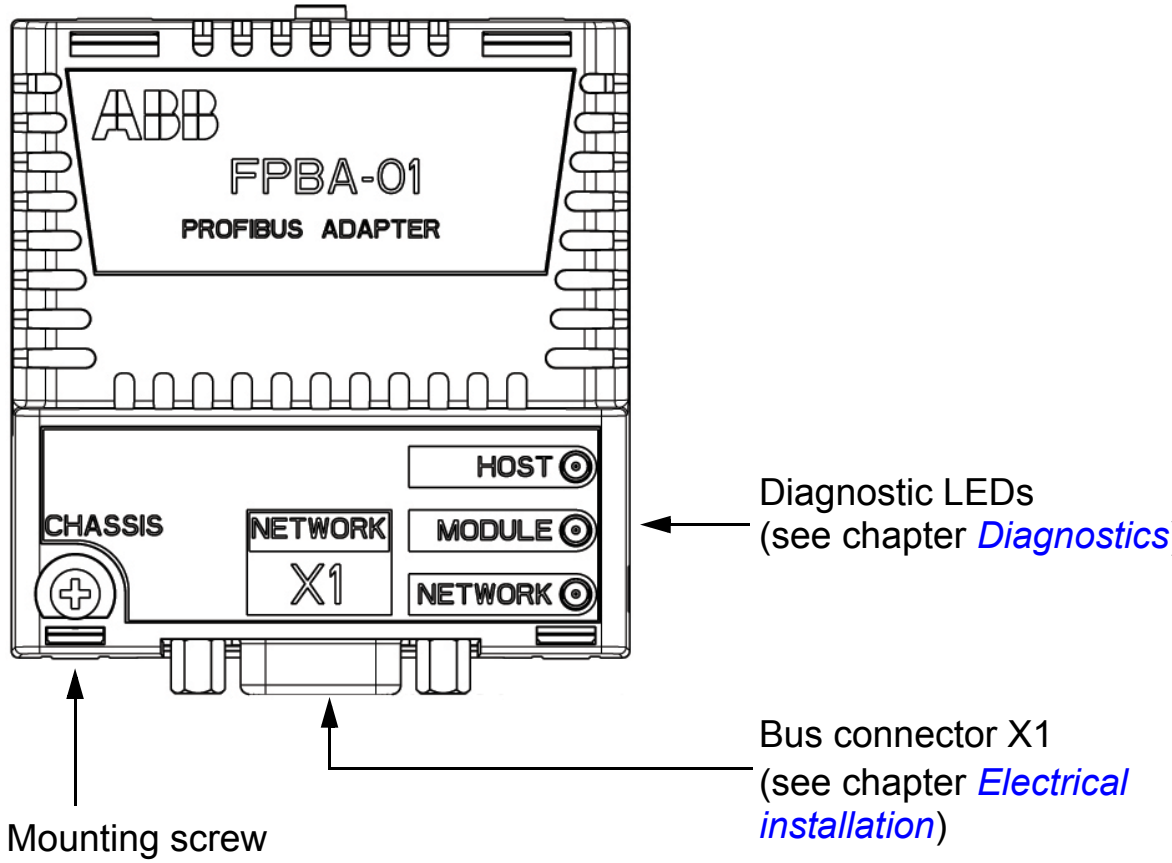
Through the adapter module you can:

- give control commands to the drive (for example, Start, Stop, Run enable)
- feed a motor speed or torque reference to the drive
- give a process actual value or a process reference to the PID controller of the drive
- read status information and actual values from the drive
- change drive parameter values
- reset a drive fault.

The PROFIBUS commands and services supported by the adapter module are described in chapter *Communication protocol*. Refer to the user documentation of the drive as to which commands are supported by the drive.

The adapter module is mounted into an option slot on the motor control board of the drive. See the drive manuals for module placement options.

Layout of the adapter module



4

Mechanical installation

What this chapter contains

This chapter contains a delivery checklist and instructions on mounting the adapter module.

WARNING! Follow the safety instructions given in this manual and the drive documentation.

Delivery check

The option package for the adapter module contains:

- PROFIBUS DP adapter module, type FPBA-01
- this manual.

Mounting the adapter module

The adapter module is to be inserted into its specific position in the drive. The module is held in place with plastic pins and one screw. The screw also provides the electrical connection between the module and drive frame for cable shield termination.

When the module is installed, the signal and power connection to the drive is made through a 20-pin connector. (All drives do not use all the available signals so the connector on the drive may have fewer pins.)

Mounting procedure:

1. Insert the module carefully into its position on the drive.
2. Fasten the screw.

Note: It is essential to install the screw properly to fulfill the EMC requirements and to ensure the proper operation of the module.

For more information on mounting, see the drive manuals.

5

Electrical installation

What this chapter contains

This chapter contains:

- general cabling instructions
- instructions on connecting the module to the PROFIBUS DP network
- instructions on switching on the bus termination.

WARNING! Before installation, switch off the drive power supply. Wait five minutes to ensure that the capacitor bank of the drive is discharged. Switch off all dangerous voltages connected from external control circuits to the inputs and outputs of the drive.

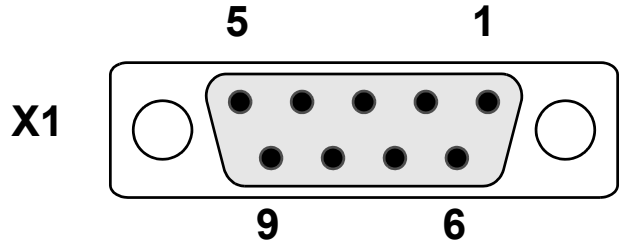
General cabling instructions

- Arrange the bus cables as far away from the motor cables as possible.
- Avoid parallel runs.
- Use bushings at cable entries.

Connecting the module to the PROFIBUS network

Connect the bus cable to connector X1 on the adapter module.

The connector pin allocation described below follows the PROFIBUS standard.



X1		Description
1	SHLD	Alternate cable shield connection. Connected to connector housing.
2		Not used
3	B	Data positive (Conductor 1 in twisted pair)
4	RTS	Request to send
5	GND_B	Isolated ground
6	+5V_B	Isolated 5 V DC voltage supply (30 mA max.)
7		Not used
8	A	Data negative (Conductor 2 in twisted pair)
9		Not used
Housing	SHLD	PROFIBUS cable shield. Internally connected to GND_B via an RC filter and directly to CH_GND (chassis).

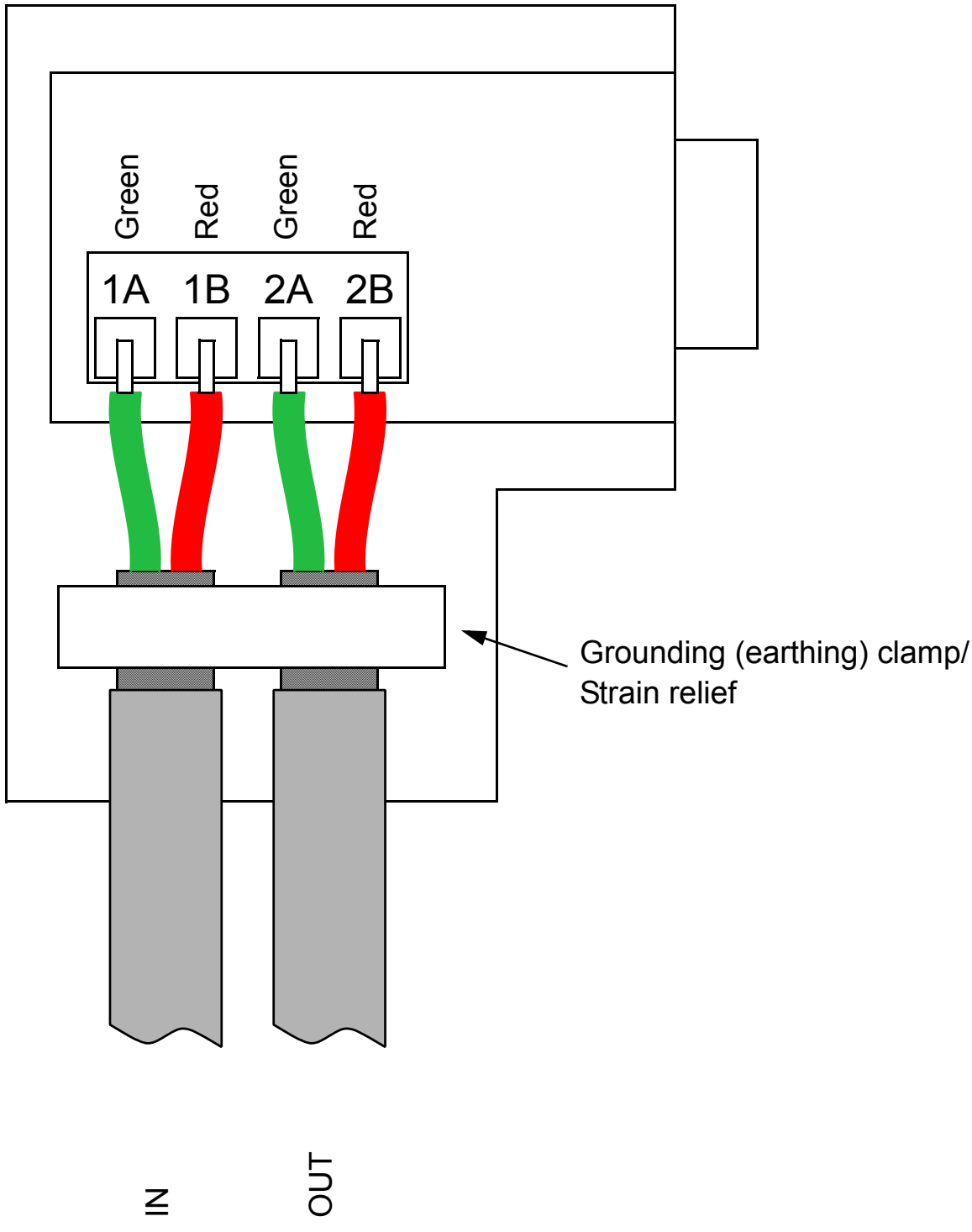
+5V_B and GND_B are used for bus termination.

RTS is used in some equipment to determine the direction of transmission.

In typical applications, only the line A, line B and shield are used.

It is recommended to use a PROFIBUS-approved D-SUB 9 connector. These connectors have a built-in termination network and inductors for station capacitance compensation.

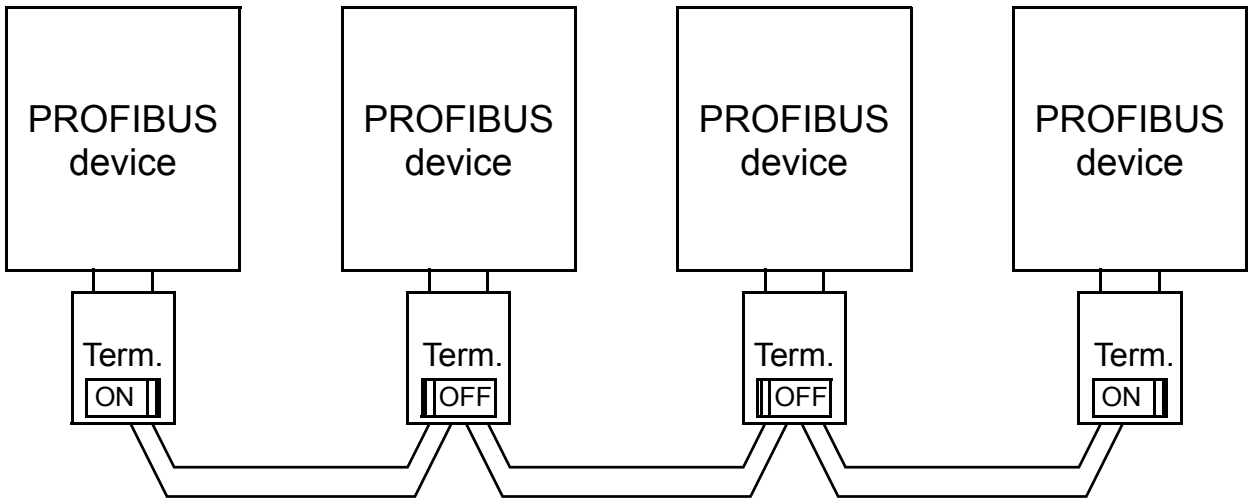
Connect the cable to the D-SUB connector as follows:



Switching on the bus termination

Bus termination is required to prevent signal reflections from the bus cable ends. The adapter module is not equipped with internal bus termination. Therefore, the D-SUB connectors at the first and last modules of the bus must have built-on termination switched on as shown in the diagram below.

The adapter module is able to supply power for an active-type termination circuitry (30 mA max.).



Note: Further information on PROFIBUS wiring is available from the publication *PROFIBUS RS 485-IS User and Installation Guideline* (www.profibus.com, order no. 2.262).

6

Start-up

What this chapter contains

This chapter contains:

- information on configuring the drive for operation with the adapter module
- drive-specific instructions on starting up the drive with the adapter module
- examples of configuring the master station for communication with the adapter module.

WARNING! Follow the safety instructions given in this manual and the drive documentation.

Drive configuration

The following information applies to all drive types compatible with the adapter module, unless otherwise stated.

PROFIBUS connection configuration

After the adapter module has been mechanically and electrically installed according to the instructions in chapters *Mechanical installation* and *Electrical installation*, the drive must be prepared for communication with the module.

The detailed procedure of activating the module for PROFIBUS DP communication with the drive depends on the drive type. Normally, a parameter must be adjusted to activate the communication. See the drive-specific start-up procedures starting on page *48*.

Once communication between the drive and the adapter module has been established, several configuration parameters are copied to the drive. These parameters are shown in the tables below and must be checked first and adjusted where necessary.

Note that not all drives display descriptive names for the configuration parameters. To help you identify the parameters in different drives, the names displayed by each drive are given in grey boxes in the tables.

Note: The new settings take effect only when the adapter module is powered up the next time or when the fieldbus adapter refresh parameter is activated.

Note: To ensure proper operation of the adapter module with the drive, also set the extended Parameter Data (see *SAP 61 (Set_Prm)* on page *103*).

Data transfer rates supported

The FPBA-01 module supports the following PROFIBUS communication speeds: 9.6 kbit/s, 19.2 kbit/s, 45.45 kbit/s, 93.75 kbit/s, 187.5 kbit/s, 500 kbit/s, 1.5 Mbit/s, 3 Mbit/s, 6 Mbit/s, 12 Mbit/s.

The module automatically detects the communication speed and telegram type used.

FPBA-01 configuration parameters – group A (group 1)

Note: The actual parameter group number depends on the drive type. Group A (group 1) corresponds to:

- parameter group 51 in ACS355, ACSM1, ACS850 and ACQ810
- parameter group 51 in ACS880 if the adapter is installed as fieldbus adapter A or group 54 if the adapter is installed as fieldbus adapter B.

No.	Name/Value	Description	Default
01	FBA TYPE	**Read-only.** Shows the fieldbus adapter type as detected by the drive. The value cannot be adjusted by the user. If the value is **0** = None, the communication between the drive and the module has not been established.	**1** = Profibus_DP
02	NODE ADDRESS **ACS355:** FB PAR 2 **ACSM1:** FBA PAR2 **ACS850/ACQ810:** FBA par2 **ACS880:** Node address	Each device on the PROFIBUS network must have a unique node number. This parameter defines a node number for the drive the module is connected to. Recommended node numbers are 3 to 125 inclusive.	3
	0…126	Node number	
03	BAUD RATE **ACS355:** FB PAR 3 **ACSM1:** FBA PAR3 **ACS850/ACQ810:** FBA par3 **ACS880:** Baud rate	**Read-only.** Indicates the detected communication speed in kbit/s. 1) Default value is 0 if there is no connection.	1500 1)
	12000	12 Mbit/s	
	6000	6 Mbit/s	
	3000	3 Mbit/s	
	1500	1.5 Mbit/s	

No.	Name/Value	Description	Default
	500	500 kbit/s	
	187	187.5 kbit/s	
	93	93.75 kbit/s	
	45	45.45 kbit/s	
	19	19.2 kbit/s	
	9	9.6 kbit/s	
04	TELEGRAM TYPE **ACS355:** FB PAR 4 **ACSM1:** FBA PAR4 **ACS850/ACQ810:** FBA par4 **ACS880:** MSG type	**Read-only.** Indicates the telegram type selected for PROFIBUS communication. The adapter module automatically detects the telegram type used. For more information on the supported PPO message types, see section *PPO types* on page *114*. If standard telegrams (ST) are used, parameter *05 PROFILE* is automatically set.	**1** = PPO1
	1 = PPO1	PPO1 selected	
	2 = PPO2	PPO2 selected	
	3 = PPO3	PPO3 selected	
	4 = PPO4	PPO4 selected	
	5 = PPO5	PPO5 selected	
	6 = PPO6	PPO6 selected	
	7 = ST1	ST1 selected	
	8 = ST2	ST2 selected. Only supported with ACSM1.	
	9 = PPO7	PPO7 selected	
	10 = PPO8	PPO8 selected	

No.	Name/Value	Description	Default
05	PROFILE **ACS355:** FB PAR 5 **ACSM1:** FBA PAR5 **ACS850/ACQ810:** FBA par5 **ACS880:** Profile	Selects the communication profile used. For more information on the communication profiles, see chapter *Communication profiles*.	**1** = ABB DRIVES
	0 = PROFIdrive	PROFIdrive profile selected. See also *Virtual address allocation with ACSM1* on page *46*.	
	1 = ABB DRIVES	ABB Drives profile selected	
	2 = Trans16	Transparent 16 profile selected	
	3 = Trans32	Transparent 32 profile selected. Not supported with ACS355.	
	4 = PROFIdrive P	PROFIdrive positioning mode selected. Only supported with ACSM1. See also *Virtual address allocation with ACSM1* on page *46*.	
06	T16 SCALE **ACS355:** FB PAR 6 **ACSM1:** FBA PAR6 **ACS850/ACQ810:** FBA par6 **ACS880:** T16 scale	Defines the reference multiplier/actual value divisor for the adapter module. The parameter is effective only when the Transparent 16 profile is selected AND the drive is using the native communication profile (for example, DCU or FBA) and a 16-bit transparent Reference 1/Actual value 1. With an ACS355 drive, the speed reference from the PLC is multiplied by the value of this parameter plus one. For example, if the parameter has a value of 99 and a reference of 1000 given by the master, the reference will be multiplied by 99 +1 = 100 and forwarded to the drive as 100000. According to the DCU profile, this value is interpreted as a reference of 100 rpm in the drive. With ACSM1, ACS850, ACQ810 and ACS880, setting this parameter to 65535 provides the approximation of 1 ≈ 1 rpm.	99
	0…65535	Reference multiplier/actual value divisor	

No.	Name/Value	Description	Default
07	RPBA MODE **ACS355:** FB PAR 7 **ACSM1:** FBA PAR7 **ACS850/ACQ810:** FBA par7 **ACS880:** RPBA mode	Enables the RPBA emulation mode for the drive. When this mode is enabled, it is possible to replace a drive using an RPBA-01 module in the PROFIBUS network with a drive using an FPBA-01 module without modifying the PLC hardware configuration.	**0** = Disabled
	0 = Disabled	RPBA emulation mode is disabled.	
	1 = Enabled	RPBA emulation mode is enabled.	
08 … 26	Reserved	These parameters are not used by the adapter module.	N/A
27	FBA PAR REFRESH **ACS355/ACSM1:** FBA PAR REFRESH **ACS850/ACQ810/ ACS880:** FBA par refresh	Validates any changed adapter module configuration parameter settings. After refreshing, the value reverts automatically to **0** = Done. **Note:** This parameter cannot be changed while the drive is running.	**0** = Done
	0 = Done	Refreshing done	
	1 = Refresh / Configure	Refreshing	
28	PAR TABLE VER **ACS355:** FILE CPI FW REV **ACSM1:** PAR TABLE VER **ACS850/ACQ810/ ACS880:** Par table ver	**Read-only.** Displays the parameter table revision of the fieldbus adapter module mapping file stored in the memory of the drive. In format **xyz**, where **x** = major revision number **y** = minor revision number **z** = correction number OR in format **axyz**, where **a** = major revision number **xy** = minor revision number **z** = correction number or letter.	N/A
		Parameter table revision	

No.	Name/Value	Description	Default
29	DRIVE TYPE CODE **ACS355:** FILE CONFIG ID **ACSM1:** DRIVE TYPE CODE **ACS850/ACQ810/ ACS880:** Drive type code	**Read-only.** Displays the drive type code of the fieldbus adapter module mapping file stored in the memory of the drive.	N/A
		Drive type code of the fieldbus adapter module mapping file	
30	MAPPING FILE VER **ACS355:** FILE CONFIG REV **ACSM1:** MAPPING FILE VER **ACS850/ACQ810/ ACS880:** Mapping file ver	**Read-only.** Displays the fieldbus adapter module mapping file revision stored in the memory of the drive in decimal format.	N/A
		Mapping file revision	
31	D2FBA COMM STA **ACS355:** FBA STATUS **ACSM1:** D2FBA COMM STA **ACS850/ACQ810/ ACS880:** D2FBA comm sta	**Read-only.** Displays the status of the fieldbus adapter module communication. **Note:** The value names may vary by drive.	**0** = Idle OR **4** = Off-line
	0 = Idle	Adapter is not configured.	
	1 = Exec.init	Adapter is initializing.	
	2 = Time out	A timeout has occurred in the communication between the adapter and the drive.	

No.	Name/Value	Description	Default
	3 = Conf.err	Adapter configuration error: The major or minor revision code of the common program revision in the fieldbus adapter module is not the revision required by the module or mapping file upload has failed more than three times.	
	4 = Off-line	Adapter is off-line.	
	5 = On-line	Adapter is on-line.	
	6 = Reset	Adapter is performing a hardware reset.	
32	FBA COMM SW VER **ACS355:** FBA CPI FW REV **ACSM1:** FBA COMM SW VER **ACS850/ACQ810:** FBA comm sw ver **ACS880:** FBA comm SW ver	**Read-only.** Displays the common program revision of the adapter module in format **axyz**, where: **a** = major revision number **xy** = minor revision number **z** = correction number or letter.	N/A
		Common program version of the adapter module	
33	FBA APPL SW VER **ACS355:** FBA APPL FW REV **ACSM1:** FBA APPL SW VER **ACS850/ACQ810:** FBA appl sw ver **ACS880:** FBA appl SW ver	**Read-only.** Displays the application program revision of the adapter module in format **axyz**, where: **a** = major revision number **xy** = minor revision number **z** = correction number or letter.	N/A
		Application program revision of the adapter module	

FPBA-01 configuration parameters – group B (group 2)

Note: The actual parameter group number depends on the drive type. Group B (group 2) corresponds to:

- parameter group 55 in ACS355
- parameter group 53 in ACSM1, ACS850 and ACQ810
- parameter group 53 in ACS880 if the adapter is installed as fieldbus adapter A or group 56 if the adapter is installed as fieldbus adapter B.

No.[1]	Name/Value	Description	Default
01	DATA OUT 1 (master to drive) **ACS355:** FBA DATA OUT 1 **ACSM1:** FBA DATA OUT1 **ACS850/ACQ810/ ACS880:** FBA data out1	Selects data word 1 received by the drive over the PROFIBUS network. The content is defined by a decimal number in the range of 0 to 9999 as follows: 0 = Not used 1…99 = Virtual address area of drive control 101…9999 = Parameter area of the drive See also *Virtual address allocation with ACSM1* on page *46*.	1 or 11[2]
	0 = None	Not used	
	1 = CW 16bit	Control word (16 bits)[3]	
	2 = Ref1 16bit	Reference REF1 (16 bits)[3]	
	3 = Ref2 16bit	Reference REF2 (16 bits)[3]	
	11 = CW 32bit	Control word (32 bits)	
	12 = Ref1 32bit	Reference REF1 (32 bits)	
	13 = Ref2 32bit	Reference REF2 (32 bits)	
	21 = CW2 16bit	Control word 2 (16 bits)	
	101…9999	Parameter index with format **xxyy**, where • **xx** is the parameter group number (1…99) • **yy** is the parameter number index within that group (01…99).	
	Other (ACS880 only)	Path to parameter area selection (ACS880 only)	

No.[1]	Name/Value	Description	Default
02	DATA OUT 2	See parameter *01 DATA OUT 1*.	0 or 2[4]
03… 12	DATA OUT 3… DATA OUT 12	See parameter *01 DATA OUT 1*.	0

[1] The number of parameters in this group may vary by drive type and drive firmware.
[2] 11 (CW 32bit) is the default setting if the Transparent 32 profile is used.
[3] With an ACS355 drive, Control word and REF 1 are always fixed to virtual addresses 1 and 2 respectively. If REF2 is used, its virtual address is always 3.
[4] 2 (Ref1 16bit) is a fixed setting with an ACS355 drive.

FPBA-01 configuration parameters – group C (group 3)

Note: The actual parameter group number depends on the drive type. Group C (group 3) corresponds to:

- parameter group 54 in ACS355
- parameter group 52 in ACSM1, ACS850 and ACQ810
- parameter group 52 in ACS880 if the adapter is installed as fieldbus adapter A or group 55 if the adapter is installed as fieldbus adapter B.

No.[1)]	Name/Value	Description	Default
01	DATA IN 1 (drive to master) **ACS355:** FBA DATA IN 1 **ACSM1:** FBA DATA IN1 **ACS850/ACQ810/ ACS880:** FBA data in1	Selects data word 1 sent by the drive over the PROFIBUS network. The content is defined by a decimal number in the range of 0 to 9999 as follows: 0 – Not used 1…99 – Virtual address area of drive control 101…9999 – Parameter area of the drive See also *Virtual address allocation with ACSM1* on page *46*.	4 or 14[2)]
	0 = None	Not used	
	4 = SW 16bit	Status word (16 bits)	
	5 = Act1 16bit	Actual value ACT1 (16 bits)	
	6 = Act2 16bit	Actual value ACT2 (16 bits)	
	14 = SW 32bit	Status word (32 bits)	
	15 = Act1 32bit	Actual value ACT1 (32 bits)	
	16 = Act2 32bit	Actual value ACT2 (32 bits)	
	24 = SW2 16bit	Status word 2 (16 bits)	
	101…9999	Parameter index with format **xxyy**, where • **xx** is the parameter group number (1…99) • **yy** is the parameter number index within that group (01…99).	
	Other (ACS880 only)	Path to parameter area selection (ACS880 only)	

No.[1]	Name/Value	Description	Default
02	DATA IN 2	See parameter *01 DATA IN 1*.	0 or 5[3]
03… 12	DATA IN 3… DATA IN 12	See parameter *01 DATA IN 1*.	0

[1] The number of parameters in this group may vary by drive type and drive firmware.
[2] 14 (SW 32bit) is the default setting if the Transparent 32 profile is used.
[3] 5 (Act1 16bit) is a fixed setting with an ACS355 drive.

Virtual address allocation with ACSM1

When the PROFIdrive profile or PROFIdrive positioning mode is used with an ACSM1 drive, the virtual addresses shown below are recommended. (FBA REFx mode is selected with drive parameter 50.04/50.05.)

The information in the table is applicable only if PPO messaging is used (see parameter *04 TELEGRAM TYPE*). If standard telegrams (STx) are used, virtual addresses for standard telegrams (ST1 and ST2) are updated automatically.

Abbreviation	Description	Data length	Recommended virtual address with ACSM1 FBA REFx modes	
			Speed mode	Position mode
STW1	Control word 1	16-bit	1	1
NSOLL_A	Speed set point A	16-bit	2 or 3	
NSOLL_B	Speed set point B	32-bit	12 or 13	
STW2	Control word 2	16-bit	21	21
XSOLL_A	Position set point A	32-bit		12 or 13
VELOCITY_A	Velocity	32-bit		13
ZSW2	Status word 2	16-bit	24	24
NIST_A	Speed actual value A	16-bit	5 or 6	
NIST_B	Speed actual value B	32-bit	15 or 16	
ZSW1	Status word 1	16-bit	4	4
XIST_A	Position actual value A	32-bit		15 or 16

Control locations

ABB drives can receive control information from multiple sources including digital inputs, analog inputs, the drive control panel and a communication module (for example, the adapter module). ABB drives allow the user to separately determine the source for each type of control information (Start, Stop, Direction, Reference, Fault reset, etc.).

In order to give the fieldbus master station the most complete control over the drive, the communication module must be selected as the source for this information. The drive-specific parameter setting examples below contain the drive control parameters needed in the examples. For a complete parameter list, see the drive documentation.

Starting up ACS355 drives

1. Power up the drive.
2. Enable the communication between the adapter module and the drive by setting parameter 9802 COMM PROT SEL to EXT FBA.
3. Set the FPBA-01 configuration parameters in group 51. At the minimum, set the required node address in parameter 5102 and the communication profile in 5105.
4. With parameter 3018 COMM FAULT FUNC, select how the drive reacts to a fieldbus communication break.
5. With parameter 3019 COMM FAULT TIME, define the time between communication break detection and the selected action.
6. Define the process data transferred to and from the drive in the FPBA-01 configuration parameter groups 54 and 55.

   Note: The adapter module sets the Status word and actual value automatically in parameters 5401 and 5402, and Control word and reference in parameters 5501 and 5502.
7. Validate the settings made in parameter groups 51, 54 and 55 by setting parameter 5127 FBA PAR REFRESH to REFRESH.
8. Set the relevant drive control parameters to control the drive according to the application.Examples of appropriate values are shown in the tables below.

Parameter setting examples – ACS355

Speed control using the PROFIdrive communication profile with PPO Type 2

This example shows how to configure a basic speed control application that uses the PROFIdrive profile. In addition, some application-specific data is added to the communication.

The start/stop commands and reference are according to the PROFIdrive profile. For more information, see the PROFIdrive state machine on page *88*.

The reference value ±16384 (4000h) corresponds to parameter 1105 REF1 MAX in the forward and reverse directions.

Direction	PZD1	PZD2	PZD3	PZD4	PZD5	PZD6
Out	Control word	Speed reference	Accelera-tion time[1)]	Decelera-tion time	N/A	N/A
In	Status word	Speed actual value	Power[1)]	DC bus voltage	N/A	N/A

[1)] Example

The table below gives the recommended drive parameter settings

Drive parameter	Setting for ACS355 drives	Description
9802 COMM PROT SEL	**4** = EXT FBA	Enables communication between the drive and the fieldbus adapter module.
5101 FBA TYPE	PROFIBUS-DP[1)]	Displays the type of the fieldbus adapter module.
5102 FB PAR 2 (NODE ADDRESS)	3[2)]	Defines the PROFIBUS node address of the fieldbus adapter module.
5103 FB PAR 3 (BAUD RATE)	12000[1)]	Displays the current baud rate on the PROFIBUS network in kbit/s.
5104 FB PAR 4 (TELEGRAM TYPE)	**2** (= PPO2)[1)]	Displays the telegram type selected by the PLC configuration tool.
5105 FB PAR 5 (PROFILE)	**0** (= PROFIdrive)	Selects the Control word according to the PROFIdrive profile (speed control mode).

Drive parameter	Setting for ACS355 drives	Description
3018 COMM FAULT FUNC	**3** = LAST SPEED	Enables fieldbus communication fault monitoring.
3019 COMM FAULT TIME	3.0 s	Defines the fieldbus communication break supervision time.
5401 FBA DATA IN 1	**4** (= SW 16bit)[1)]	Status word
5402 FBA DATA IN 2	**5** (= Act1 16bit)[1)]	Actual value 1 (speed)
5403 FBA DATA IN 3	106[2)]	Power
5404 FBA DATA IN 4	107[2)]	DC bus voltage
5501 FBA DATA OUT 1	**1** (= CW 16bit)[1)]	Control word
5502 FBA DATA OUT 2	**2** (= Ref1 16bit)[1)]	Reference 1 (speed)
5503 FBA DATA OUT 3	2202[2)]	Acceleration time
5504 FBA DATA OUT 4	2203[2)]	Deceleration time
5127 FBA PAR REFRESH	**1** = REFRESH	Validates the FPBA-01 configuration parameter settings.
1001 EXT1 COMMANDS	**10** = COMM	Selects the fieldbus interface as the source of the start and stop commands for external control location 1.
1103 REF1 SELECT	**8** = COMM	Selects the fieldbus reference 1 as the source for speed reference 1.
1601 RUN ENABLE	**7** = COMM	Selects the fieldbus interface as the source for the inverted Run enable signal (Run disable).
1604 FAULT RESET SEL	**8** = COMM	Selects the fieldbus interface as the source for the fault reset signal.

[1)] Read-only or automatically detected/set
[2)] Example

The start sequence for the parameter example above is given below.

Control word:

- 47Eh (1150 decimal) –> READY TO SWITCH ON
- 47Fh (1151 decimal) –> OPERATING (Speed mode)

Speed and torque control using the ABB Drives communication profile with PPO Type 4

This example shows how to configure a speed and torque control application that uses the ABB Drives profile. From the PLC programming point, the ABB Drives profile is similar to the PROFIdrive profile shown in the first example.

The start/stop commands and reference are according to the ABB Drives profile. For more information, see section *ABB Drives communication profile* on page *92*.

When Reference 1 (REF1) is used, a reference value of ±20000 (decimal) corresponds to the reference set by parameter 1105 REF1 MAX in the forward and reverse directions.

When Reference 2 (REF2) is used, a reference value of ±10000 (decimal) corresponds to the reference set by parameter 1108 REF2 MAX in the forward and reverse directions.

The minimum and maximum 16-bit integer values that can be given through the fieldbus are -32768 and 32767 respectively.

Direction	PZD1	PZD2	PZD3	PZD4	PZD5	PZD6
Out	Control word	Speed reference	Torque reference	N/A	N/A	N/A
In	Status word	Speed actual value	Torque actual	N/A	N/A	N/A

The table below gives the recommended drive parameter settings.

Drive parameter	Setting for ACS355 drives	Description
9802 COMM PROT SEL	**4** = EXT FBA	Enables communication between the drive and the fieldbus adapter module.
5101 FBA TYPE	PROFIBUS-DP[1)]	Displays the type of the fieldbus adapter module.
5102 FB PAR 2 (NODE ADDRESS)	4[2)]	Defines the PROFIBUS node address of the fieldbus adapter module.
5103 FB PAR 3 (BAUD RATE)	1500[1)]	Displays the current baud rate on the PROFIBUS network in kbit/s.
5104 FB PAR 4 (TELEGRAM TYPE)	**4** (= PPO4)[1)]	Displays the telegram type selected by the PLC configuration tool.
5105 FB PAR 5 (PROFILE)	**1** (= ABB DRIVES)	Selects the Control word according to the ABB Drives profile.
3018 COMM FAULT FUNC	**3** = LAST SPEED	Enables fieldbus communication fault monitoring.
3019 COMM FAULT TIME	3.0 s	Defines the fieldbus communication break supervision time.
5401 FBA DATA IN 1	**4** (= SW 16bit)[1)]	Status word
5402 FBA DATA IN 2	**5** (= Act1 16bit)[1)]	Actual value 1 (speed)
5403 FBA DATA IN 3	**6** (= Act2 16bit)[2)]	Actual value 2 (torque)
5501 FBA DATA OUT 1	**1** (= CW 16bit)**[1)]**	Control word
5502 FBA DATA OUT 2	**2** (= Ref1 16bit)[1)]	Reference 1 (speed)
5503 FBA DATA OUT 3	**3** (= Ref2 16bit)[2)]	Reference 2 (torque)
5127 FBA PAR REFRESH	**1** = REFRESH	Validates the FPBA-01 configuration parameter settings.
9904 MOTOR CTRL MODE	**2** = VECTOR: TORQ	Selects the vector control mode as the motor control mode.

Drive parameter	Setting for ACS355 drives	Description
1001 EXT1 COMMANDS	**10** = COMM	Selects the fieldbus interface as the source of the start and stop commands for external control location 1.
1002 EXT2 COMMANDS	**10** = COMM	Selects the fieldbus interface as the source of the start and stop commands for external control location 2.
1102 EXT1/EXT2 SEL	**8** = COMM	Enables external control location 1/2 selection through the fieldbus.
1103 REF1 SELECT	**8** = COMM	Selects the fieldbus reference 1 as the source for speed reference 1.
1106 REF2 SELECT	**8** = COMM	Selects the fieldbus reference 2 as the source for speed reference 1.
1601 RUN ENABLE	**7** = COMM	Selects the fieldbus interface as the source for the inverted Run enable signal (Run disable).
1604 FAULT RESET SEL	**8** = COMM	Selects the fieldbus interface as the source for the fault reset signal.

[1] Read-only or automatically detected/set
[2] Example

The start sequence for the parameter example above is given below.

Control word:

- 47Eh (1150 decimal) –> READY TO SWITCH ON
- 47Fh (1151 decimal) –> OPERATING (Speed mode)
- C7Fh (3199 decimal) –> OPERATING (Torque mode)

Starting up ACSM1 drives

1. Power up the drive.
2. Enable the communication between the adapter module and the drive by setting parameter 50.01 FBA ENABLE to Enable.
3. With parameter 50.02 COMM LOSS FUNC, select how the drive reacts to a fieldbus communication break.

   Note that this function monitors both communication between the fieldbus master and the adapter module and communication between the adapter module and the drive.
4. With parameter 50.03 COMM LOSS T OUT, define the time between communication break detection and the selected action.
5. Select application-specific values for parameters 50.04…50.11. Examples of appropriate values are shown in the tables below.
6. Set the FPBA-01 configuration parameters in group 51. At the minimum, set the required node address in parameter 51.02 and the communication profile in 51.05.
7. Define the process data transferred to and from the drive in the FPBA-01 configuration parameter groups 52 and 53.

   Note: The adapter module sets the Status word and Control word automatically in parameters 52.01 and 53.01.
8. Validate the settings made in parameter groups 51, 52 and 53 by setting parameter 51.27 FBA PAR REFRESH to REFRESH.
9. Set the relevant drive control parameters to control the drive according to the application.Examples of appropriate values are shown in the tables below.

Parameter setting examples – ACSM1

Speed control using the PROFIdrive communication profile with PPO Type 2

This example shows how to configure a basic speed control application that uses the PROFIdrive profile. In addition, some application-specific data is added to the communication.

The start/stop commands and reference are according to the PROFIdrive profile, speed control mode. For more information, see the PROFIdrive state machine on page *88*.

The reference value ±16384 (4000h) corresponds to parameter 25.02 SPEED SCALING in the forward and reverse directions.

Direction	PZD1	PZD2	PZD3	PZD4	PZD5	PZD6
Out	Control word	Speed reference	Acceleration time[1)]		Deceleration time[1)]	
In	Status word	Speed actual value	Power[1)]		DC bus voltage[1)]	

[1)] Example

The table below gives the recommended drive parameter settings.

Drive parameter	Setting for ACSM1 drives	Description
50.01 FBA ENABLE	Enable	Enables communication between the drive and the fieldbus adapter module.
50.02 COMM LOSS FUNC	Last speed	Enables fieldbus communication fault monitoring.
50.03 COMM LOSS T OUT	3.0 s	Defines the fieldbus communication break supervision time.
50.04 FBA REF1 MODESEL	Speed	Selects the fieldbus reference 1 scaling.
51.01 FBA TYPE	PROFIBUS-DP[1)]	Displays the type of the fieldbus adapter module.
51.02 FBA PAR2 (NODE ADDRESS)	3[2)]	Defines the PROFIBUS node address of the fieldbus adapter module.

Drive parameter	Setting for ACSM1 drives	Description
51.03 FBA PAR3 (BAUD RATE)	12000[1)]	Displays the current baud rate on the PROFIBUS network in kbit/s.
51.04 FBA PAR4 (TELEGRAM TYPE)	**2** (= PPO2)[1)]	Displays the telegram type selected by the PLC configuration tool.
51.05 FBA PAR5 (PROFILE)	**0** (= PROFIdrive)	Selects the Control word according to the PROFIdrive profile (speed control mode).
52.01 FBA DATA IN1	**4** (= SW 16bit)[1)]	Status word
52.02 FBA DATA IN2	**5** (= Act1 16bit)	Actual value 1 (speed)
52.03 FBA DATA IN3	122[2)]	Power
52.05 FBA DATA IN5	107[2)]	DC bus voltage
53.01 FBA DATA OUT1	**1** (= CW 16bit)[1)]	Control word
53.02 FBA DATA OUT2	**2** (= Ref1 16bit)	Reference 1 (speed)
53.03 FBA DATA OUT3	2503[2)]	Acceleration time
53.05 FBA DATA OUT5	2504[2)]	Deceleration time
51.27 FBA PAR REFRESH	REFRESH	Validates the FPBA-01 configuration parameter settings.
10.01 EXT1 START FUNC	FBA	Selects the fieldbus interface as the source of the start and stop commands for external control location 1.
24.01 SPEED REF1 SEL	FBA REF1	Selects the fieldbus reference 1 as the source for speed reference 1.
34.03 EXT1 CTRL MODE1	Speed	Selects speed control as the control mode 1 for external control location 1.

[1)] Read-only or automatically detected/set
[2)] Example

The start sequence for the parameter example above is given below.

Control word:

- 47Eh (1150 decimal) –> READY TO SWITCH ON
- 47Fh (1151 decimal) –> OPERATING (Speed mode)

Position control using the PROFIdrive communication profile with PPO Type 4

This example shows how to configure a basic positioning application. The start/stop commands and reference are according to the PROFIdrive profile, positioning mode. For more information, see the PROFIdrive state machine on page 89.

Note: By default, fieldbus is not the only control source. See actual signal 02.12 FBA MAIN CW in *ACSM1 motion control program firmware manual* for details.

The position set point and velocity reference are defined as 32-bit integer values; both are scaled as defined by drive parameter settings.

Direction	PZD1	PZD2	PZD3	PZD4	PZD5	PZD6
Out	Control word (STW1)	Position set point		Velocity reference		N/A
In	Status word (ZSW1)	Position actual value		Velocity actual value		N/A

The table below gives the recommended drive parameter settings.

Drive parameter	Setting for ACSM1 drives	Description
50.01 FBA ENABLE	Enable	Enables communication between the drive and the fieldbus adapter module.
50.02 COMM LOSS FUNC	Fault	Enables fieldbus communication fault monitoring.
50.03 COMM LOSS T OUT	3.0 s	Defines the fieldbus communication break supervision time.
50.04 FBA REF1 MODESEL	Position	Selects the fieldbus reference 1 scaling.

Drive parameter	Setting for ACSM1 drives	Description
50.05 FBA REF2 MODESEL	Velocity	Selects the fieldbus reference 2 scaling.
51.01 FBA TYPE	PROFIBUS-DP[1)]	Displays the type of the fieldbus adapter module.
51.02 FBA PAR2 (NODE ADDRESS)	3[2)]	Defines the PROFIBUS node address of the fieldbus adapter module.
51.03 FBA PAR3 (BAUD RATE)	12000[1)]	Displays the current baud rate on the PROFIBUS network in kbit/s.
51.04 FBA PAR4 (TELEGRAM TYPE)	**4** (= PPO4)[1)]	Displays the telegram type selected by the PLC configuration tool.
51.05 FBA PAR5 (PROFILE)	**4** (= PROFIdrive P)	Selects the Control word according to the PROFIdrive positioning mode.
52.01 FBA DATA IN1	**4** (= SW 16bit)[1)]	Status word
52.02 FBA DATA IN2	**15** (= Act1 32bit)	Actual value 1
52.04 FBA DATA IN4	**16** (= Act2 32bit)	Actual value 2
53.01 FBA DATA OUT1	**1** (= CW 16bit)[1)]	Control word
53.02 FBA DATA OUT2	**12** (= Ref1 32bit)	Reference 1
53.04 FBA DATA OUT4	**13** (= Ref2 32bit)	Reference 2
51.27 FBA PAR REFRESH	REFRESH	Validates the FPBA-01 configuration parameter settings.
10.01 EXT1 START FUNC	FBA	Selects the fieldbus interface as the source of the start and stop commands for external control location 1.
22.01 SPEED FB SEL	Enc1 speed[2)]	Selects the actual speed measured by encoder 1 as the speed feedback.
34.02 EXT1 MODE 1/2SEL	P.FBA MAIN CW.26	Selects the source for external 1 control mode 1/2 selection. Selection is done by START_HOMING bit (bit 26 in the fieldbus Control word). Mode 1: Position, Mode 2: Homing
34.03 EXT1 CTRL MODE1	Position	Selects position control as the control mode 1 for external control location 1.

Drive parameter	Setting for ACSM1 drives	Description
34.04 EXT1 CTRL MODE2	Homing	Selects homing control as the control mode 2 for external control location 1.
62.01 HOMING METHOD	CAN Methodxx	Selects the homing mode. Select the appropriate CAN Method.
62.03 HOMING START	C.False	Selects the fieldbus as the homing start source.
65.01 POS REFSOURCE	Fieldbus	Position reference and speed are read from the fieldbus.
65.03 POS START 1	C.False	Selects the fieldbus as the position start1 source.
65.04 POS REF 1 SEL	FBA REF 1	Selects the FBA reference 1 as the position reference source.
65.11 POS START 2	C.False	Selects the fieldbus as the position start2 source.
65.22 PROF VEL REF SEL	FBA REF2	Selects the FBA reference 2 as the velocity reference source.
66.05 POS ENABLE	C.False	Selects the fieldbus as the source for enabling the position reference generator.
70.03 POS REF ENA	C.False	Selects the fieldbus as the source for the position reference enable command.

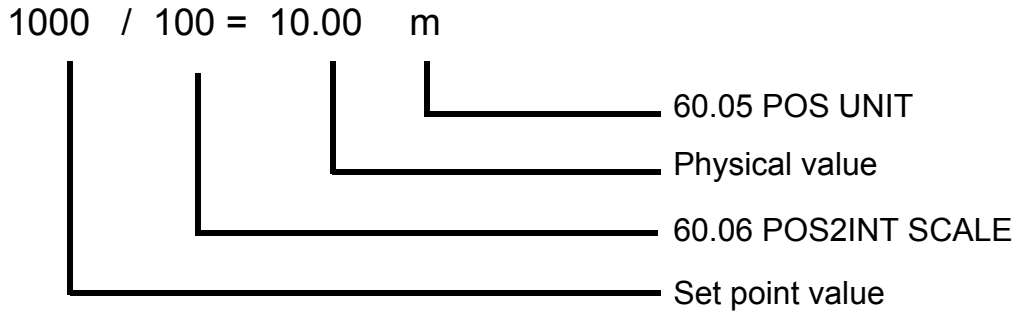
[1] Read-only or automatically detected/set
[2] Example

The position set point is scaled as follows:

Drive parameter	Setting
60.05 POS UNIT (Position unit)	m[1]
60.08 POS2INT SCALE	100[1]

[1] Example

The position set point and actual values are scaled with the above example values as follows:

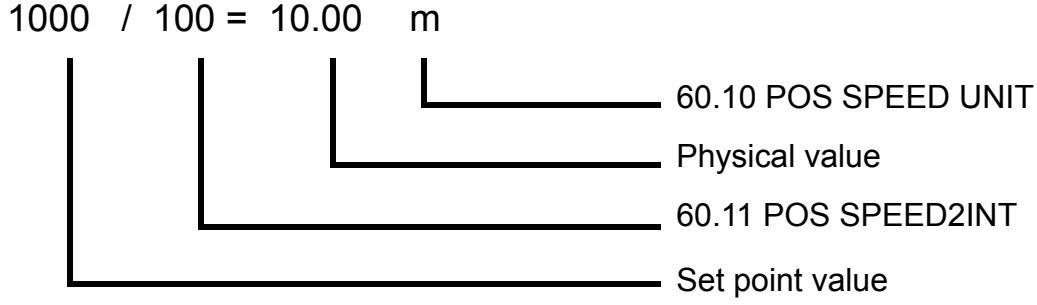


Example for velocity set point scale:

Drive parameter	Name	Value	Description
60.10	POS SPEED UNIT	u/s[1)]	Unit/s (in this case m/s)
60.11	POS SPEED2INT	100[1)]	Scales position speed values to integer values. Selections: 1/10/100/1000/10000/100000

[1)] Example

The velocity set point and actual values are scaled with the above example values as follows:



Pay attention to the following parameter groups:

Group	Description
90	Encoder selection
91/92/93	Settings of the encoder

The start sequence for the above parameter example is given below:

Control word:

- 406h (1030 decimal) –> READY TO SWITCH ON
- 40Fh (1039 decimal) –> OPERATING
- 43Fh (1087 decimal) –> OPERATING (Do reject traversing task with no intermediate stop)
- 47Fh (1151 decimal) –> OPERATING (Activate traversing task)
- C0Fh (3087 decimal) –> OPERATING (Start Homing procedure)

Speed and torque control using the ABB Drives communication profile with PPO Type 4

This example shows how to configure a speed and torque control application that uses the ABB Drives profile. From the PLC programming point, the ABB Drives profile is similar to the PROFIdrive profile shown in the first example.

The start/stop commands and reference are according to the ABB Drives profile. For more information, see section *ABB Drives communication profile* on page *92*.

When Reference 1 (REF1) is used, a reference value of ±20000 (4E20h) corresponds to the reference set by parameter 25.02 SPEED SCALING in the forward and reverse directions.

When Reference 2 (REF2) is used, a reference value of ±10000 (2710h) corresponds to the reference set by parameter 32.04 TORQUE REF 1 MAX in the forward and reverse directions.

Direction	PZD1	PZD2	PZD3	PZD4	PZD5	PZD6
Out	Control word	Speed reference	Torque reference	N/A	N/A	N/A
In	Status word	Speed actual value	Torque actual	N/A	N/A	N/A

The table below gives the recommended drive parameter settings.

Drive parameter	Setting for ACSM1 drives	Description
50.01 FBA ENABLE	Enable	Enables communication between the drive and the fieldbus adapter module.
50.02 COMM LOSS FUNC	Fault	Enables fieldbus communication fault monitoring.
50.03 COMM LOSS T OUT	3.0 s	Defines the fieldbus communication break supervision time.
50.04 FBA REF1 MODESEL	Speed	Selects the fieldbus reference 1 scaling.
50.05 FBA REF2 MODESEL	Torque	Selects the fieldbus reference 2 scaling.
51.01 FBA TYPE	PROFIBUS-DP[1)]	Displays the type of the fieldbus adapter module.
51.02 FBA PAR2 (NODE ADDRESS)	3[2)]	Defines the PROFIBUS node address of the fieldbus adapter module.
51.03 FBA PAR3 (BAUD RATE)	12000[1)]	Displays the current baud rate on the PROFIBUS network in kbit/s.
51.04 FBA PAR4 (TELEGRAM TYPE)	**4** (= PPO4)[1)]	Displays the telegram type selected by the PLC configuration tool.
51.05 FBA PAR5 (PROFILE)	**1** (= ABB DRIVES)	Selects the Control word according to the ABB Drives profile.
52.01 FBA DATA IN1	**4** (= SW 16bit)[1)]	Status word (PZD 1)
52.02 FBA DATA IN2	**5** (= Act1 16bit)[2)]	Actual value 1
52.03 FBA DATA IN3	**6** (= Act2 16bit)[2)]	Actual value 2
53.01 FBA DATA OUT1	**1** (= CW 16bit[1)]	Control word
53.02 FBA DATA OUT2	**2** (= Ref1 16bit[2)]	Reference 1
53.03 FBA DATA OUT3	**3** (= Ref2 16bit[2)]	Reference 2
51.27 FBA PAR REFRESH	REFRESH	Validates the FPBA-01 configuration parameter settings.
10.01 EXT1 START FUNC	FBA	Selects the fieldbus interface as the source of the start and stop commands for external control location 1.

Drive parameter	Setting for ACSM1 drives	Description
10.04 EXT2 START FUNC	FBA	Selects the fieldbus interface as the source of the start and stop commands for external control location 2.
24.01 SPEED REF1 SEL	FBA REF1	Selects the fieldbus reference 1 as the source for speed reference 1.
32.02 TORQ REF ADD SEL	FBA REF2	Selects the fieldbus reference 2 as the source for torque reference 1.
34.01 EXT1/EXT2 SEL	P.FBA MAIN CW.15	Enables external control location 1/2 selection through the fieldbus only (bit 15 in the fieldbus Control word).
34.03 EXT1 CTRL MODE1	Speed	Selects speed control as the control mode 1 for external control location 1.
34.05 EXT2 CTRL MODE1	Torque	Selects torque control as the control mode 1 for external control location 2.

[1] Read-only or automatically detected/set
[2] Example

The start sequence for the parameter example above is given below.

Control word:

- 47Eh (1150 decimal) –> READY TO SWITCH ON
- 47Fh (1151 decimal) –> OPERATING (Speed mode)
- C7Fh (3199 decimal) –> OPERATING (Torque mode)

Starting up ACS850 and ACQ810 drives

1. Power up the drive.
2. Enable the communication between the adapter module and the drive by setting parameter 50.01 FBA enable to Enable.
3. With parameter 50.02 Comm loss func, select how the drive reacts to a fieldbus communication break.

   Note that this function monitors both communication between the fieldbus master and the adapter module and communication between the adapter module and the drive.
4. With parameter 50.03 Comm loss t out, define the time between communication break detection and the selected action.
5. Select application-specific values for parameters 50.04…50.11. Examples of appropriate values are shown in the tables below.
6. Set the FPBA-01 configuration parameters in group 51. At the minimum, set the required node address in parameter 51.02 and the communication profile in 51.05.
7. Define the process data transferred to and from the drive in the FPBA-01 configuration parameter groups 52 and 53.

   Note: The adapter module sets the Status word and Control word automatically in parameters 52.01 and 53.01.
8. Validate the settings made in parameter groups 51, 52 and 53 by setting parameter 51.27 FBA par refresh to Refresh.
9. Set the relevant drive control parameters to control the drive according to the application.Examples of appropriate values are shown in the tables below.

Parameter setting examples – ACS850 and ACQ810

Speed control using the PROFIdrive communication profile with PPO Type 2

This example shows how to configure a basic speed control application that uses the PROFIdrive profile. In addition, some application-specific data is added to the communication.

The start/stop commands and reference are according to the PROFIdrive profile, speed control mode. For more information, see the PROFIdrive state machine on page 88.

The reference value ±16384 (4000h) corresponds to parameter 19.01 Speed scaling in the forward and reverse directions.

Direction	PZD1	PZD2	PZD3	PZD4	PZD5	PZD6
Out	Control word	Speed reference	Acceleration time[1)]		Deceleration time[1)]	
In	Status word	Speed actual value	Power[1)]		DC bus voltage[1)]	

[1)] Example

The table below gives the recommended drive parameter settings.

Drive parameter	Setting for ACS850/ACQ810 drives	Description
50.01 Fba enable	Enable	Enables communication between the drive and the fieldbus adapter module.
50.02 Comm loss func	Fault	Enables fieldbus communication fault monitoring.
50.03 Comm loss t out	3.0 s	Defines the fieldbus communication break supervision time.
50.04 Fb ref1 modesel	Speed	Selects the fieldbus reference 1 scaling.
51.01 FBA type	Profibus-DP[1)]	Displays the type of the fieldbus adapter module.
51.02 FBA par2 (NODE ADDRESS)	3[2)]	Defines the PROFIBUS node address of the fieldbus adapter module.

Drive parameter	Setting for ACS850/ACQ810 drives	Description
51.03 FBA par3 (BAUD RATE)	12000[1)]	Displays the current baud rate on the PROFIBUS network in kbit/s.
51.04 FBA par4 (TELEGRAM TYPE)	**2** (= PPO2)[1)]	Displays the telegram type selected by the PLC configuration tool.
51.05 FBA par5 (PROFILE)	**0** (= PROFIdrive)	Selects the Control word according to the PROFIdrive profile (speed control mode).
52.01 FBA data in1	**4** (= SW 16bit)[1)]	Status word
52.02 FBA data in2	**5** (= Act1 16bit)	Actual value 1 (speed)
52.03 FBA data in3	122[2)]	Power (32-bit)
52.05 FBA data in5	107[2)]	DC bus voltage (32-bit)
53.01 FBA data out1	**1** (= CW 16bit)[1)]	Control word
53.02 FBA data out2	**2** (= Ref1 16bit)	Reference 1 (speed)
53.03 FBA data out3	2202[2)]	Acceleration time (32-bit)
53.05 FBA data out5	2203[2)]	Deceleration time (32-bit)
51.27 FBA par refresh	Refresh	Validates the FPBA-01 configuration parameter settings.
10.01 Ext1 start func	FB	Selects the fieldbus interface as the source of the start and stop commands for external control location 1.
21.01 Speed ref1 sel (ACS850) 21.01 Speed ref sel (ACQ810)	FBA ref1 FBA ref1	Selects the fieldbus reference 1 as the source for speed reference 1.

[1)] Read-only or automatically detected/set
[2)] Example

The start sequence for the parameter example above is given below.

Control word:

- 47Eh (1150 decimal) –> READY TO SWITCH ON
- 47Fh (1151 decimal) –> OPERATING (Speed mode)

Starting up ACS880 drives

1. Power up the drive.
2. Enable the communication between the adapter module and the drive by setting parameter 50.01 FBA A Enable to Enable.
3. With parameter 50.02 FBA A comm loss func, select how the drive reacts to a fieldbus communication break.

   Note that this function monitors both communication between the fieldbus master and the adapter module and communication between the adapter module and the drive.
4. With parameter 50.03 FBA A comm loss t out, define the time between communication break detection and the selected action.
5. Select application-specific values for the rest of the parameters in group 50, starting from 50.04. Examples of appropriate values are shown in the tables below.
6. Set the FPBA-01 configuration parameters in group 51. At the minimum, set the required node address in parameter 51.02 Node address and the communication profile in 51.05 Profile.
7. Define the process data transferred to and from the drive in FPBA-01 configuration parameter groups 52 and 53.

   Note: The adapter module sets the Status word and Control word automatically in parameters 52.01 and 53.01.
8. Save the valid parameter values to permanent memory by setting parameter 96.07 Param save to Save.
9. Validate the settings made in parameter groups 51, 52 and 53 by setting parameter 51.27 FBA par refresh to Configure.
10. Set the relevant drive control parameters to control the drive according to the application. Examples of appropriate values are shown in the tables below.

Parameter setting examples – ACS880

Speed control using the PROFIdrive communication profile with PPO Type 2

This example shows how to configure a basic speed control application that uses the PROFIdrive profile.

The start/stop commands and reference are according to the PROFIdrive profile, speed control mode. For more information, see the PROFIdrive state machine on page *88*.

The reference value ±16384 (4000h) corresponds to parameter 46.10 Speed scaling in the forward and reverse directions.

Direction	PZD1	PZD2	PZD3	PZD4	PZD5	PZD6
Out	Control word	Speed reference	Acc time 1		Dec time 1	
In	Status word	Speed actual value	Motor current		DC voltage	

The table below gives the recommended drive parameter settings.

Drive parameter	Setting for ACS880 drives	Description
50.01 FBA A Enable	**1** = Enable	Enables communication between the drive and the fieldbus adapter module.
50.04 FBA A ref1 type	**4** = Speed	Selects the fieldbus A reference 1 type and scaling.
50.07 FBA A act1 type	**0** = Auto	Selects the actual value type and scaling according to the currently active Ref1 mode defined in parameter 50.04.
51.01 FBA TYPE	**1** = Profibus_DP[1)]	Displays the type of the fieldbus adapter module.
51.02 Node address	3[2)]	Defines the PROFIBUS node address of the fieldbus adapter module.
51.03 Baud rate	12000[1)]	Displays the current baud rate on the PROFIBUS network in kbit/s.
51.04 MSG type	**1** = PPO1[1)]	Displays the telegram type selected by the PLC configuration tool.

Drive parameter	Setting for ACS880 drives	Description
51.05 Profile	**0** = PROFIdrive	Selects the Control word according to the PROFIdrive profile (speed control mode).
51.07 RPBA mode	**0** = Disabled	Disables the RPBA emulation mode.

52.01 FBA data in1	**4** = SW 16bit[1)]	Status word
52.02 FBA data in2	**5** = Act1 16bit	Actual value 1
52.03 FBA data in3	P.1.7[2)]	Motor current
52.05 FBA data in5	P.1.11[2)]	DC voltage
53.01 FBA data out1	**1** = CW 16bit[1)]	Control word
53.02 FBA data out2	**2** = Ref1 16bit	Reference 1 (speed)
53.03 FBA data out3	P.23.12[2)]	Acc time 1
53.05 FBA data out5	P.23.13[2)]	Dec time 1

51.27 FBA par refresh	**1** = Configure	Validates the FPBA-01 configuration parameter settings.

19.12 Ext1 ctrl mode1	**2** = Speed	Selects speed control as the control mode 1 for external control location 1.
20.01 Ext1 commands	**8** = Fieldbus A	Selects the fieldbus A interface as the source of the start and stop commands for external control location 1.
22.11 Speed ref1 selection	FB A ref1	Selects the fieldbus A reference 1 as the source for speed reference 1.

[1)] Read-only or automatically detected/set
[2)] Example

The start sequence for the parameter example above is given below.

Control word:

- 47Eh (1150 decimal) –> READY TO SWITCH ON
- 47Fh (1151 decimal) –> OPERATING (Speed mode)

Configuring the master station

After the adapter module has been initialized by the drive, the master station must be prepared for communication with the module. Examples of an ABB AC500 PLC and Siemens SIMATIC S7 PLC are given below. If you are using another master system, refer to its documentation for more information.

The examples can be applied to all drive types compatible with the module.

Downloading the GSD file

Configuration of the master station requires a type definition (GSD) file.Downloadthe FPBA-01 GSD file from the Document library (www.abb.com/drives).

- For DP-V0 communication, the file name is **ABB_0959.GSD**.
- For DP-V1 communication, the file name is **ABB10959.GSD**.

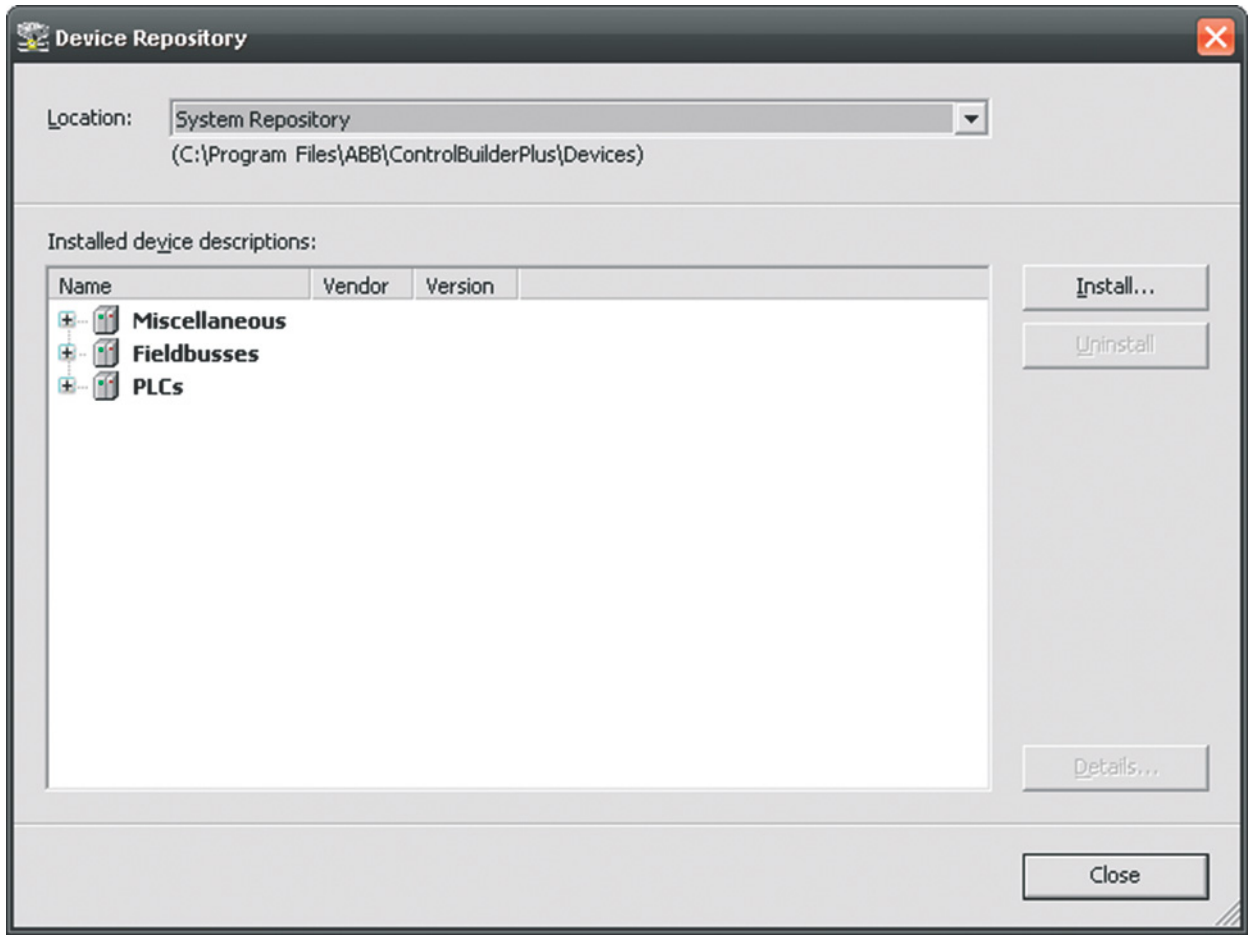
The GSD file describes the vendor-specific and PROFIdrive-specific features of the adapter module. Vendor-specific features can be used, for example, in the ABB Drives communication profile. The PROFIdrive profile supports a set of services described in the PROFIdrive specification.

Configuring an ABB AC500 PLC

This example shows how to configure the communication between an ABB AC500 PLC and the adapter module using the Control Builder Plus PS501 software, version 2.1.0 and later.

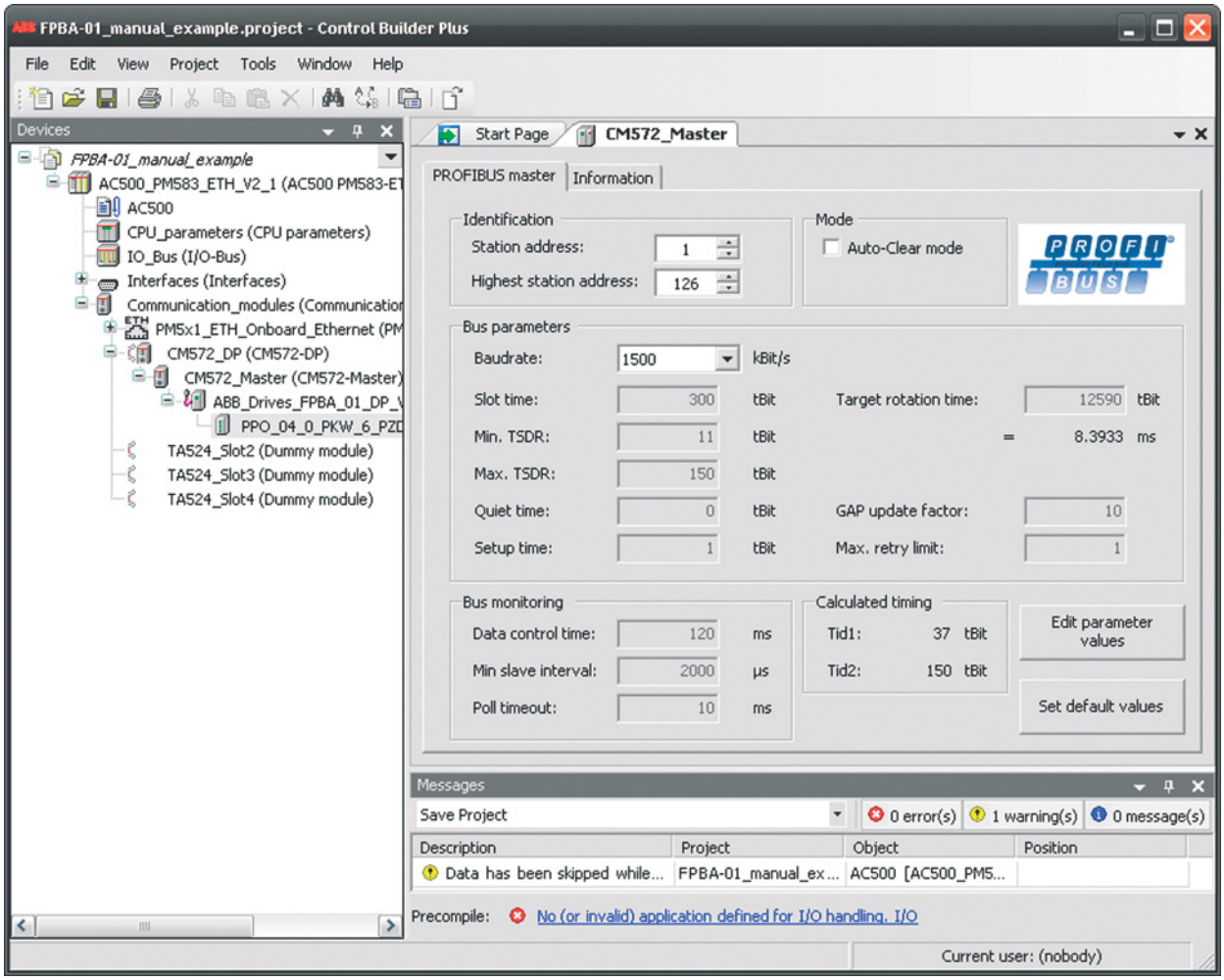
Before you start, make sure that you have downloaded the FPBA-01 GSD file from the Document library.

1. Start the ABB Control Builder software.
2. On the **Tools** menu, select **Device Repository**.
3. In the window that opens, click **Install...** and browse for the GSD file.



4. Open or create the PLC project that is used to control the drive.
5. Add the CM572-DP PROFIBUS master device to the PLC project, if necessary.
6. Add the FPBA-01 module to the PROFIBUS network.
7. Add the DP module, for example, PPO Type 4 to the FPBA-01 module to define cyclical communication between the adapter module and the PLC.

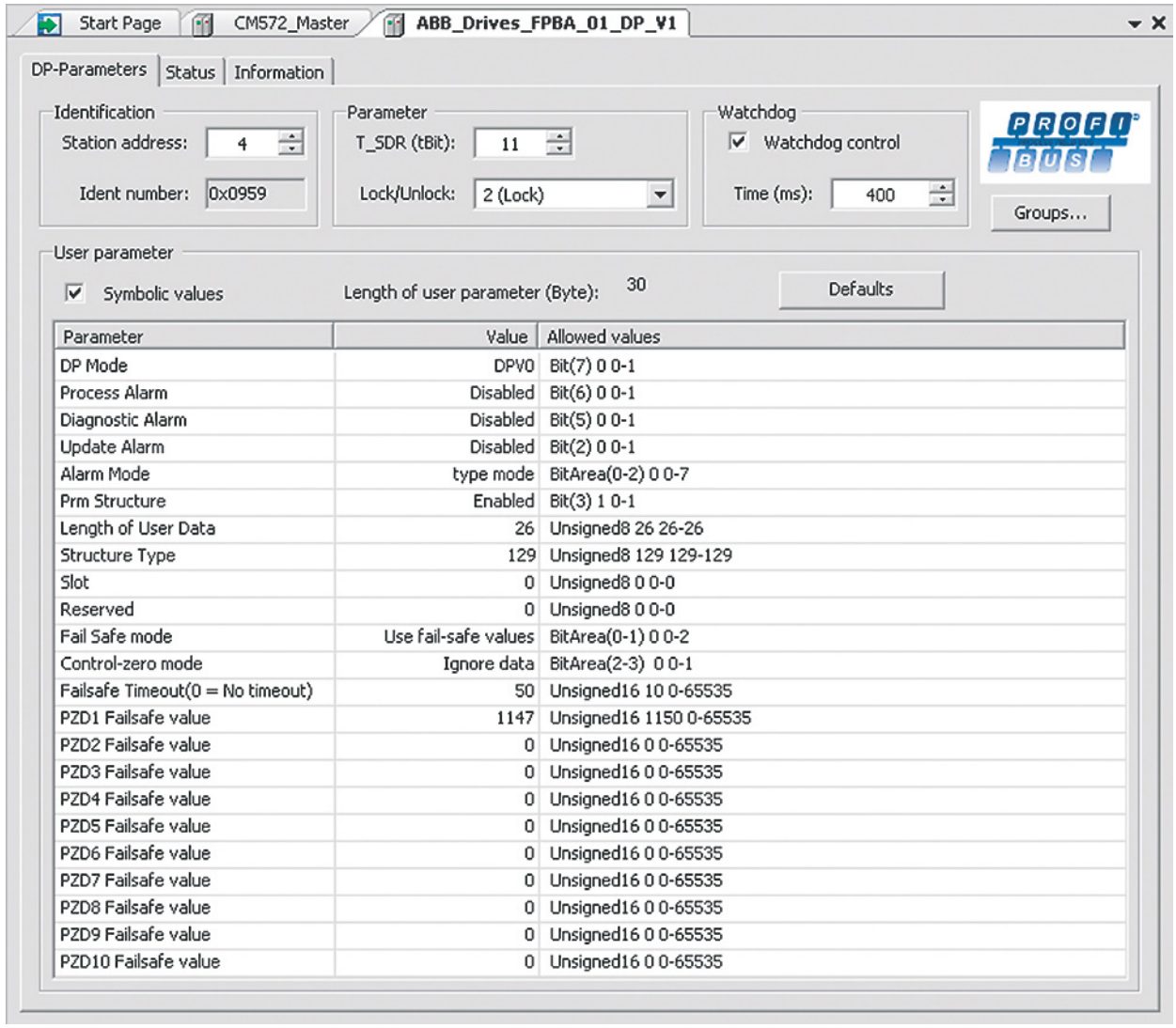
8. Define the CM572-DP master properties, such as the Baud rate, Node address (Station address) and the Highest station address.



9. Define the FPBA-01 properties:

   On the **DP-Parameters** tab,

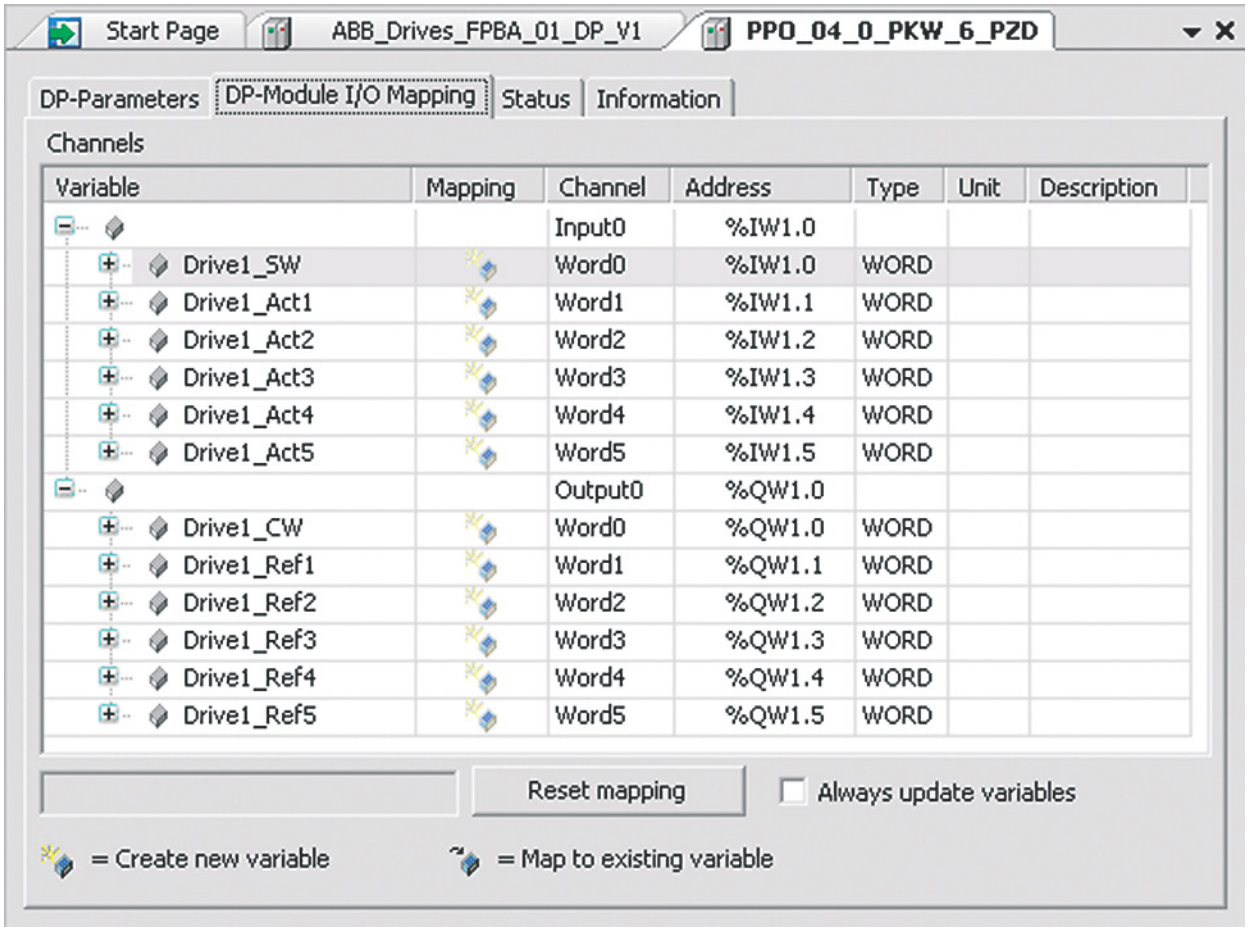
   - select the Node address (Station address) and the DP Mode
   - configure the Fail-safe functionality.



Parameter	Value	Allowed values
DP Mode	DPV0	Bit(7) 0 0-1
Process Alarm	Disabled	Bit(6) 0 0-1
Diagnostic Alarm	Disabled	Bit(5) 0 0-1
Update Alarm	Disabled	Bit(2) 0 0-1
Alarm Mode	type mode	BitArea(0-2) 0 0-7
Prm Structure	Enabled	Bit(3) 1 0-1
Length of User Data	26	Unsigned8 26 26-26
Structure Type	129	Unsigned8 129 129-129
Slot	0	Unsigned8 0 0-0
Reserved	0	Unsigned8 0 0-0
Fail Safe mode	Use fail-safe values	BitArea(0-1) 0 0-2
Control-zero mode	Ignore data	BitArea(2-3) 0 0-1
Failsafe Timeout(0 = No timeout)	50	Unsigned16 10 0-65535
PZD1 Failsafe value	1147	Unsigned16 1150 0-65535
PZD2 Failsafe value	0	Unsigned16 0 0-65535
PZD3 Failsafe value	0	Unsigned16 0 0-65535
PZD4 Failsafe value	0	Unsigned16 0 0-65535
PZD5 Failsafe value	0	Unsigned16 0 0-65535
PZD6 Failsafe value	0	Unsigned16 0 0-65535
PZD7 Failsafe value	0	Unsigned16 0 0-65535
PZD8 Failsafe value	0	Unsigned16 0 0-65535
PZD9 Failsafe value	0	Unsigned16 0 0-65535
PZD10 Failsafe value	0	Unsigned16 0 0-65535

10. Define the DP module properties:

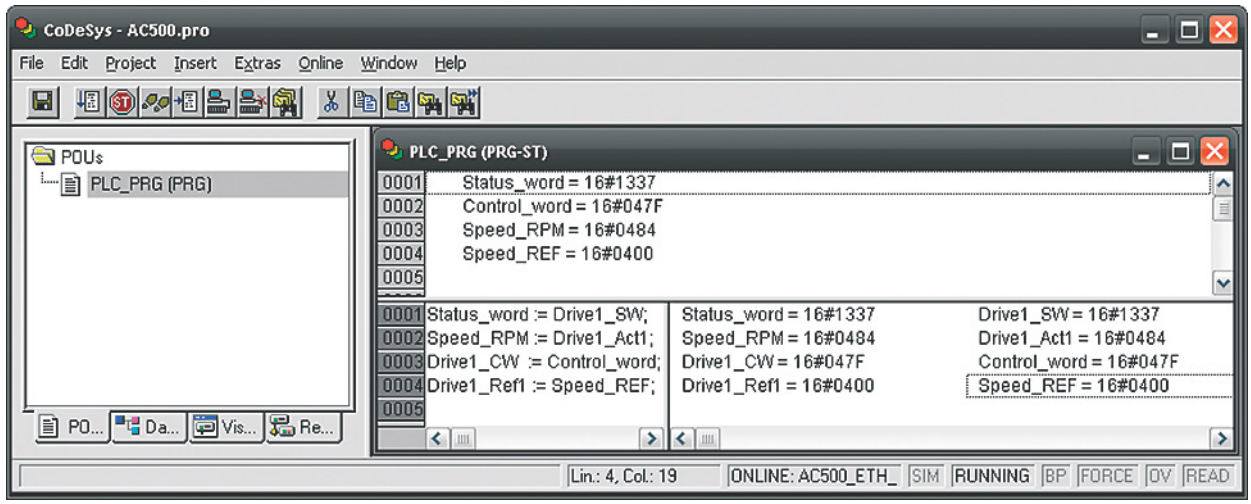
    On the **DP-module I/O Mapping** tab, type names for the variables that refer to the drive's signals in the PLC program.



11. Open the PLC program and create a program that controls the drive.

12. Compile the project and download it to the PLC.

    Note: Make sure that the variable names defined for the drive's signals are used in the PLC program. Otherwise the communication will not work.

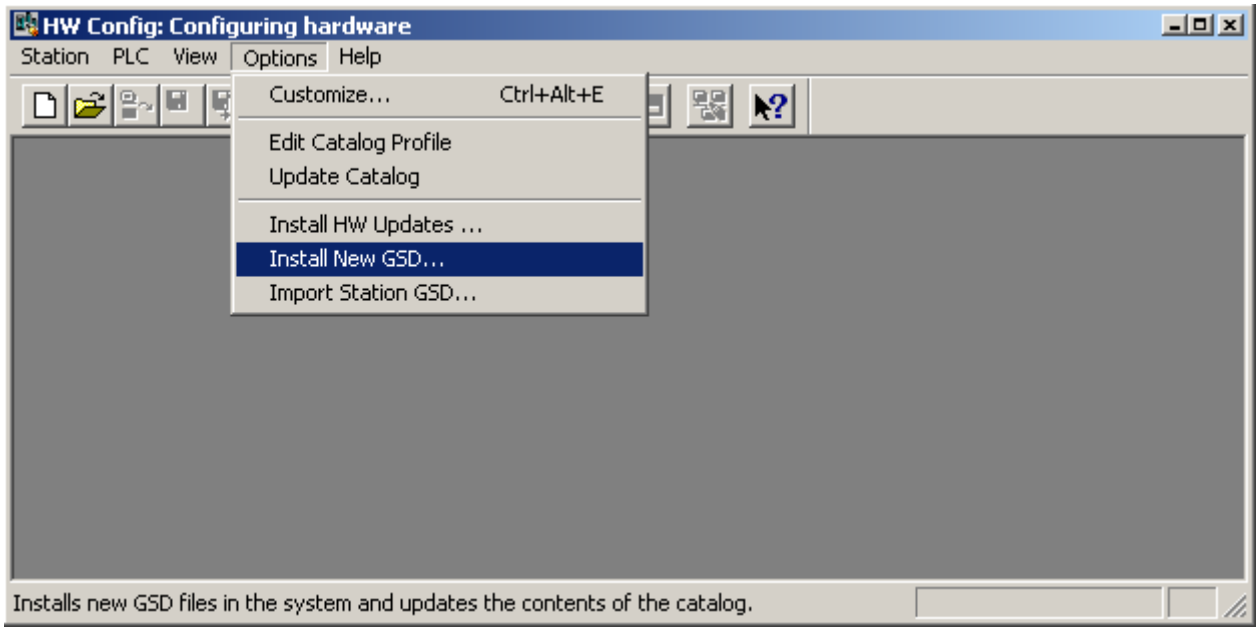


Configuring a Siemens SIMATIC S7 PLC

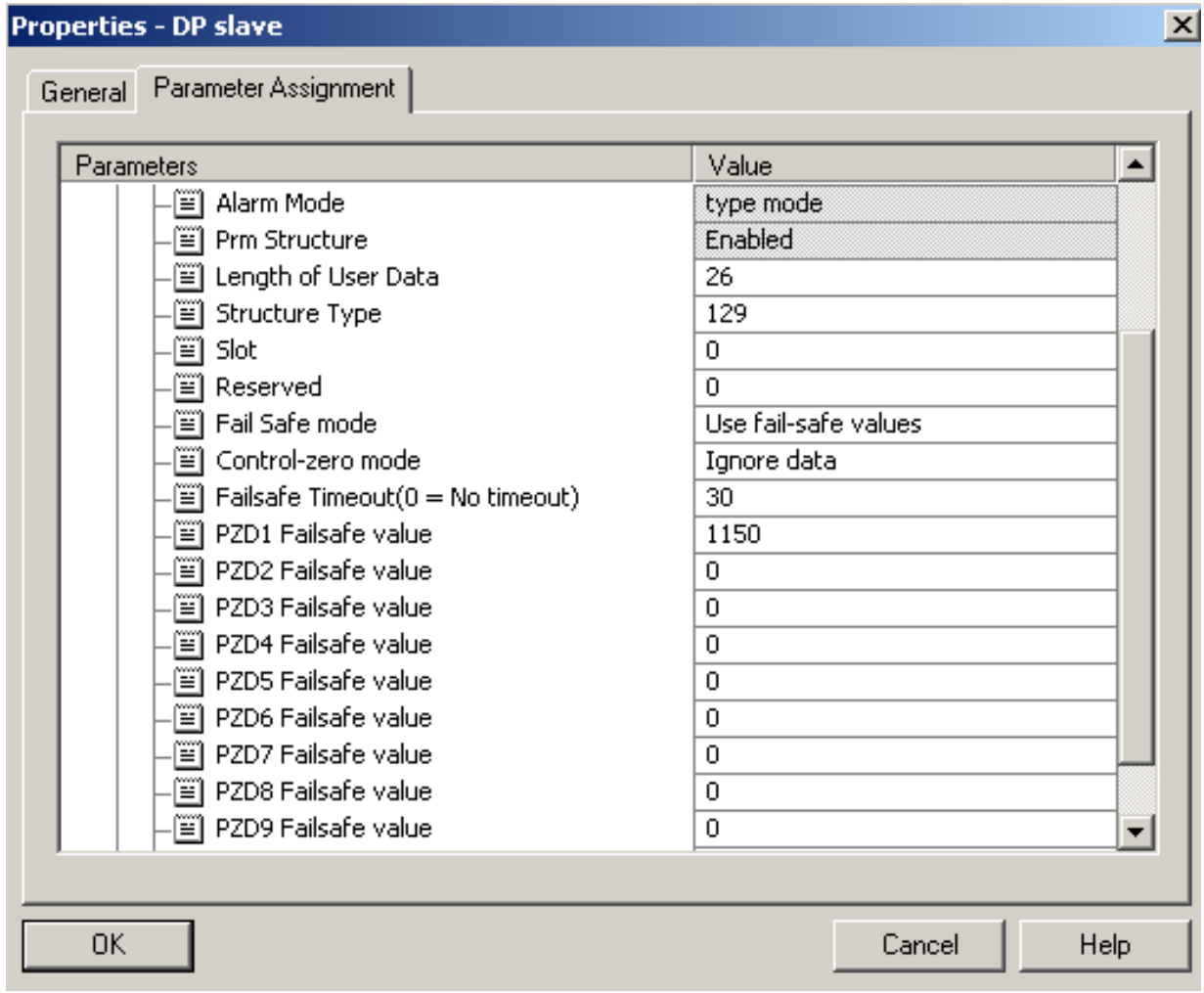
This example shows how to configure the communication between a Siemens SIMATIC S7 PLC and the adapter module using SIMATIC Manager Step 7.

Before you start, make sure that you have downloaded the FPBA-01 GSD file from the Document library.

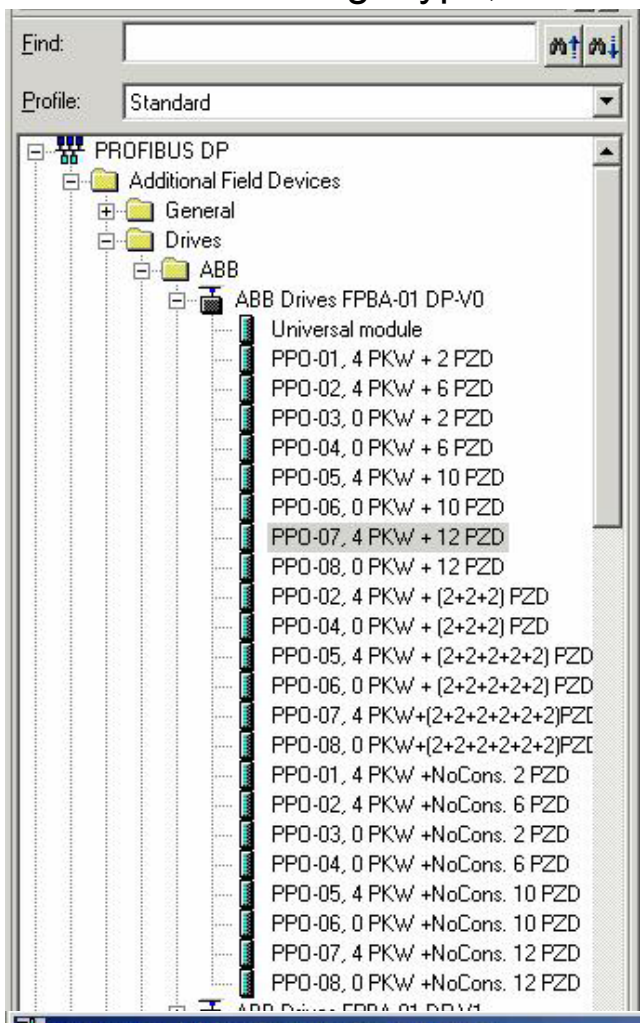
1. Install the GSD file.

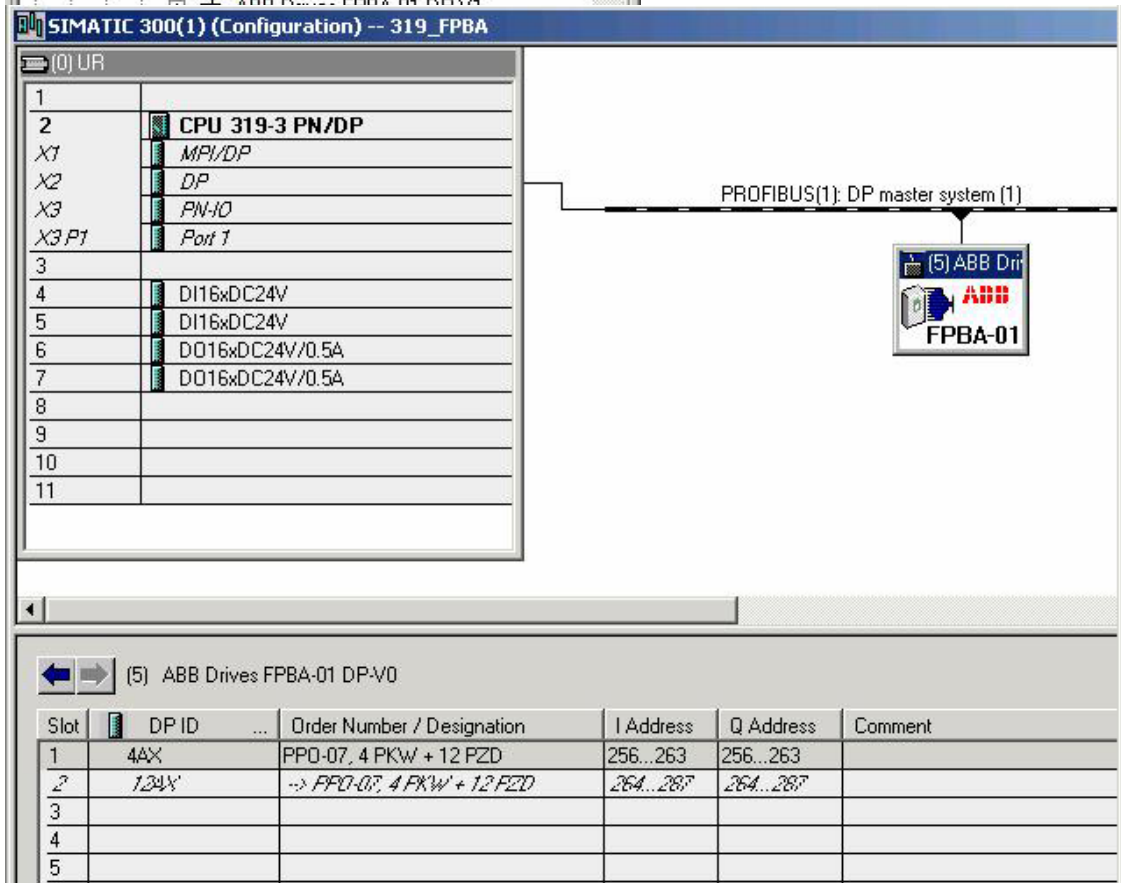


2. Select the Fail Safe mode and enter a Failsafe Timeout value.



3. Set the message type, baud rate and node number.

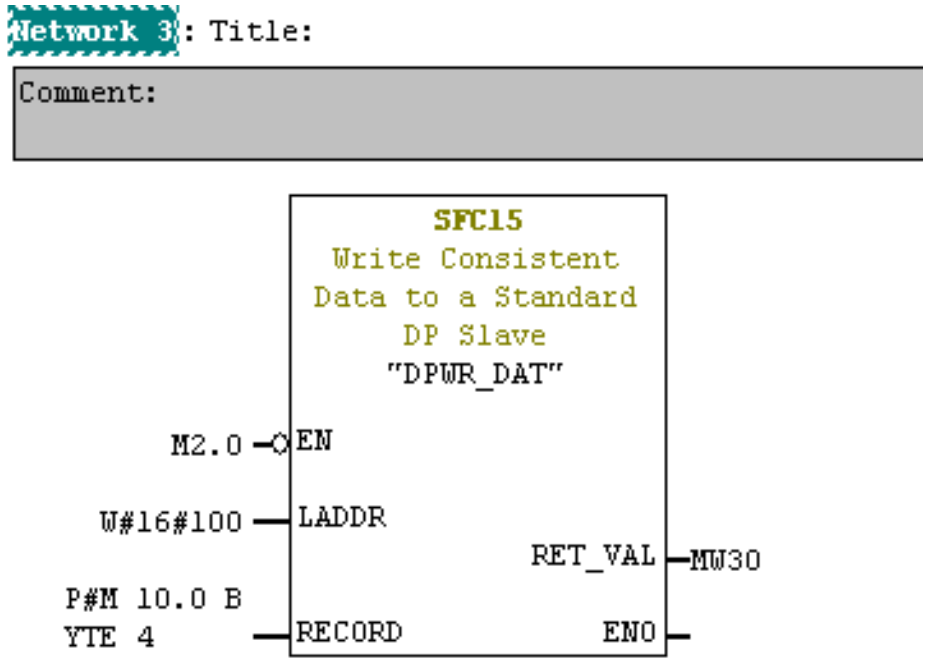

Find:
Profile:
Standard
PROFIBUS DP
Additional Field Devices
General
Drives
ABB
ABB Drives FPBA-01 DP-V0
Universal module
PPO-01, 4 PKW + 2 PZD
PPO-02, 4 PKW + 6 PZD
PPO-03, 0 PKW + 2 PZD
PPO-04, 0 PKW + 6 PZD
PPO-05, 4 PKW + 10 PZD
PPO-06, 0 PKW + 10 PZD
PPO-07, 4 PKW + 12 PZD
PPO-08, 0 PKW + 12 PZD
PPO-02, 4 PKW + (2+2+2) PZD
PPO-04, 0 PKW + (2+2+2) PZD
PPO-05, 4 PKW + (2+2+2+2+2) PZD
PPO-06, 0 PKW + (2+2+2+2+2) PZD
PPO-07, 4 PKW+(2+2+2+2+2+2)PZ
PPO-08, 0 PKW+(2+2+2+2+2+2)PZ
PPO-01, 4 PKW +NoCons. 2 PZD
PPO-02, 4 PKW +NoCons. 6 PZD
PPO-03, 0 PKW +NoCons. 2 PZD
PPO-04, 0 PKW +NoCons. 6 PZD
PPO-05, 4 PKW +NoCons. 10 PZD
PPO-06, 0 PKW +NoCons. 10 PZD
PPO-07, 4 PKW +NoCons. 12 PZD
PPO-08, 0 PKW +NoCons. 12 PZD

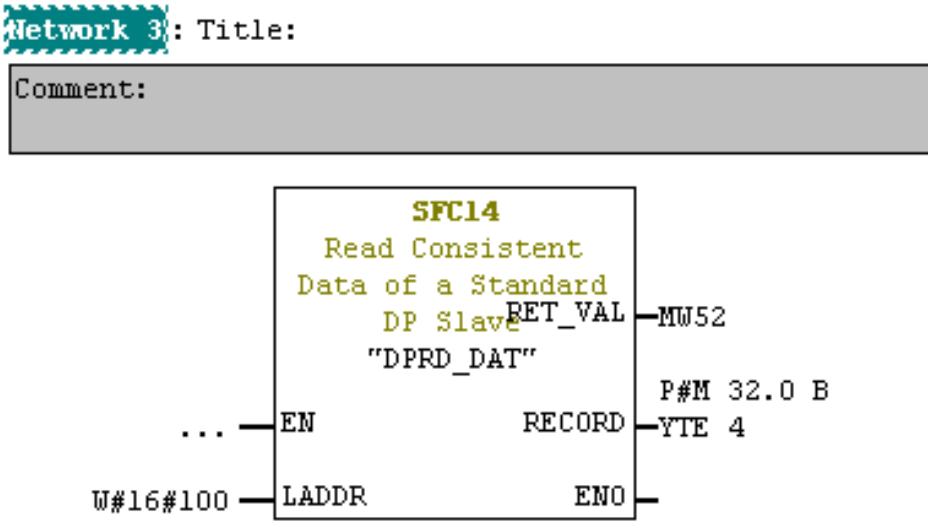


Cyclic data handling

With FPBA-01, both data-consistent and non-consistent communication can be used, data-consistent meaning that the whole cyclic data frame is transmitted during a single program cycle. Some PLCs handle this internally, but others must be programmed to transmit data-consistent telegrams. For more information, see chapter *Communication protocol*.

For example, Siemens SIMATIC S7 requires the use of special functions SFC15 and SFC14.





7

Communication profiles

What this chapter contains

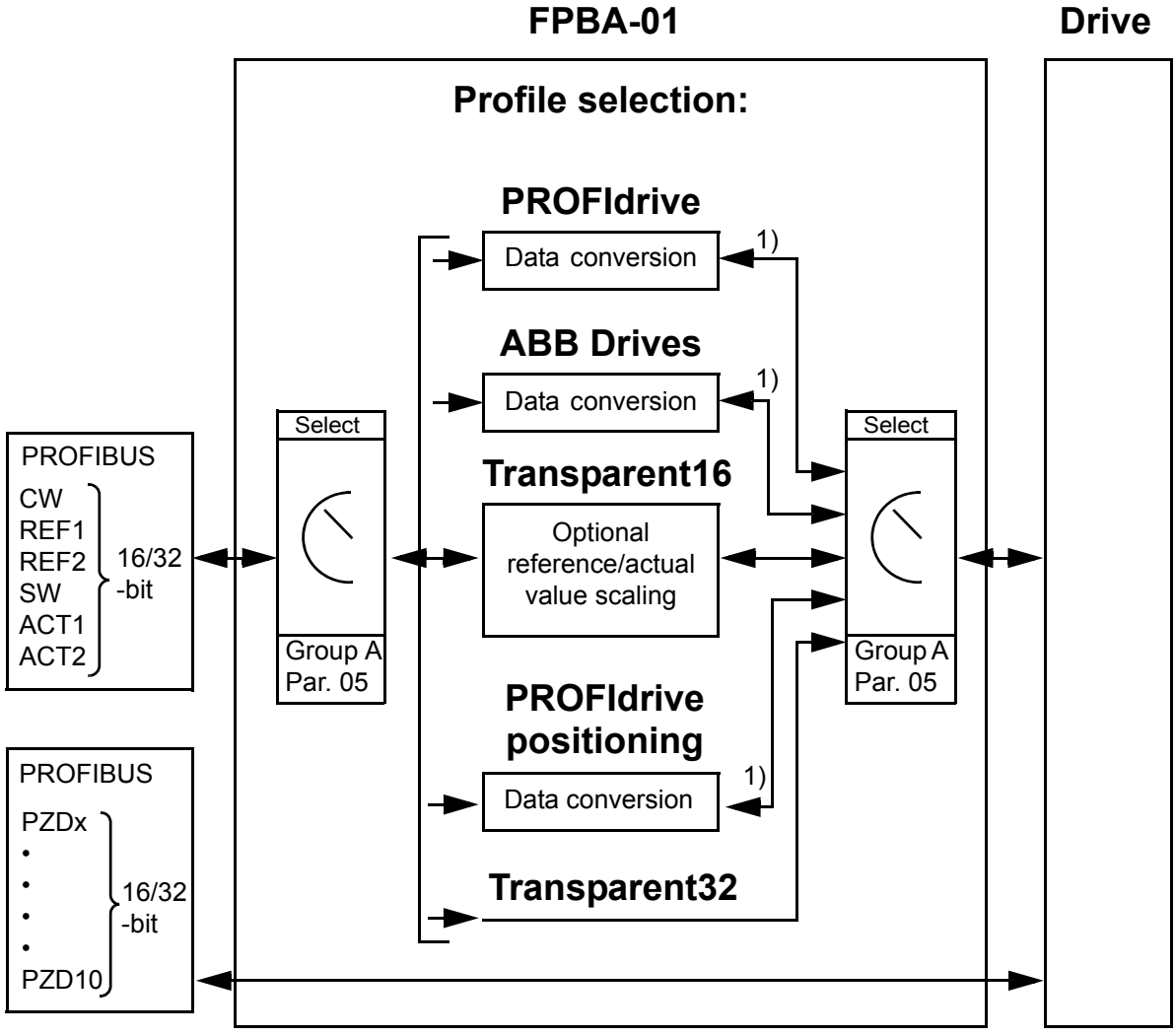
This chapter describes the communication profiles used in the communication between the PROFIBUS network, the adapter module and the drive.

Communication profiles

Communication profiles are ways of conveying control commands (Control word, Status word, references and actual values) between the master station and the drive.

With the FPBA-01 module, the PROFIBUS network may employ either the PROFIdrive profile or the ABB Drives profile. Both are converted to the native profile (eg, DCU or FBA) by the adapter module. In addition, two Transparent modes – for 16-bit and 32-bit words respectively – are available. With the Transparent modes, no data conversion takes place.

The figure below illustrates the profile selection:



1) Native profile (eg, DCU or FBA)

Note: The diagram is applicable only when PPO messaging is used. If standard telegrams (ST) are used, the communication profile is selected automatically.

The following sections describe the Control word, the Status word, references and actual values for the PROFIdrive and ABB Drives communication profiles. Refer to the drive manuals for details on the native profiles.

PROFIdrive communication profile

Control word and Status word

The Control word (PROFIdrive parameter 967) is the principal means for controlling the drive from a fieldbus system. It is sent by the fieldbus master station to the drive through the adapter module. The drive switches between its states according to the bit-coded instructions in the Control word and returns status information to the master in the Status word (PROFIdrive parameter 968).

The contents of the Control word and the Status word are detailed below; see the drive documentation for information on the drive-specific bits. The drive states for all operating modes are presented on page *88*. The drive states for the positioning mode are presented on page *89*.

Control word contents

The table below shows the contents of the Control word for the PROFIdrive communication profile (PROFIdrive parameter 967). The upper case boldface text refers to the states shown in the state machine on page *88*.

Bit	Name	Value	STATE/Description	
			Speed control mode	Positioning mode
0	ON	1	Proceed to **READY TO OPERATE**.	
	OFF1	0	Emergency OFF, stop by the selected deceleration ramp. Proceed to **OFF1 ACTIVE;** proceed further to **READY TO SWITCH ON** unless other interlocks (OFF2, OFF3) are active.	
1	OFF2	1	Continue operation (OFF2 inactive).	
		0	Emergency OFF, coast to stop. Proceed to **OFF2 ACTIVE**; proceed further to **SWITCH-ON INHIBIT**.	
2	OFF3	1	Continue operation (OFF3 inactive).	

Bit	Name	Value	STATE/Description	
			Speed control mode	Positioning mode
		0	Emergency stop, stop according to fastest possible deceleration mode. Proceed to **OFF3 ACTIVE**; proceed further to **SWITCH-ON INHIBIT. Warning:** Ensure motor and driven machine can be stopped using this stop mode.	
3	OPERATION_ ENABLE	1	Proceed to **ENABLE OPERATION**.	
		0	Inhibit operation. Proceed to **OPERATION INHIBIT**.	
4	ENABLE_ RAMP_ GENERATOR or TRAVERSING _TASK	1	Normal operation. Proceed to **RAMP FUNCTION GENERATOR: ENABLE OUTPUT**.	Normal operation. Do not reject traversing task.
		0	Stop according to selected stop type.	Reject traversing task.
5		1	Normal operation. Proceed to **RAMP FUNCTION GENERATOR: ENABLE ACCELERATOR**.	Normal operation. No intermediate stop.
		0	Halt ramping (Ramp Function Generator output held).	Intermediate stop
6		1	Normal operation. Proceed to **OPERATING**. **Note:** This bit is effective only if the fieldbus interface is set as the source for this signal by drive parameters.	Activate traversing task (0 –> 1). This is a toggle bit; each rising edge of signal enables a traversing task or a new set point.
		0	Force Ramp Function Generator input to zero.	

Bit	Name	Value	STATE/Description	
			Speed control mode	Positioning mode
7	RESET	0 –> 1	Fault reset if an active fault exists. Proceed to **SWITCH-ON INHIBIT.** **Note:** This bit is effective only if the fieldbus interface is set as the source for this signal by drive parameters.	
		0	(Continue normal operation)	
8	JOGGING_1		Jogging 1 (Not supported by all drive types)	
9	JOGGING_2		Jogging 2 (Not supported by all drive types)	
10	REMOTE_ CMD	1	Fieldbus control enabled	
		0	Control word <> 0 or reference <> 0: Retain last Control word and reference. Control word = 0 and reference = 0: Fieldbus control enabled.	
11		1	Vendor-specific bit as defined by PROFIdrive parameter 933.	Start homing procedure.
		0		Stop homing procedure.
12			Vendor-specific bit as defined by PROFIdrive parameter 934	
13			Vendor-specific bit as defined by PROFIdrive parameter 935	
14			Vendor-specific bit as defined by PROFIdrive parameter 936	
15			Vendor-specific bit as defined by PROFIdrive parameter 937	

Status word contents

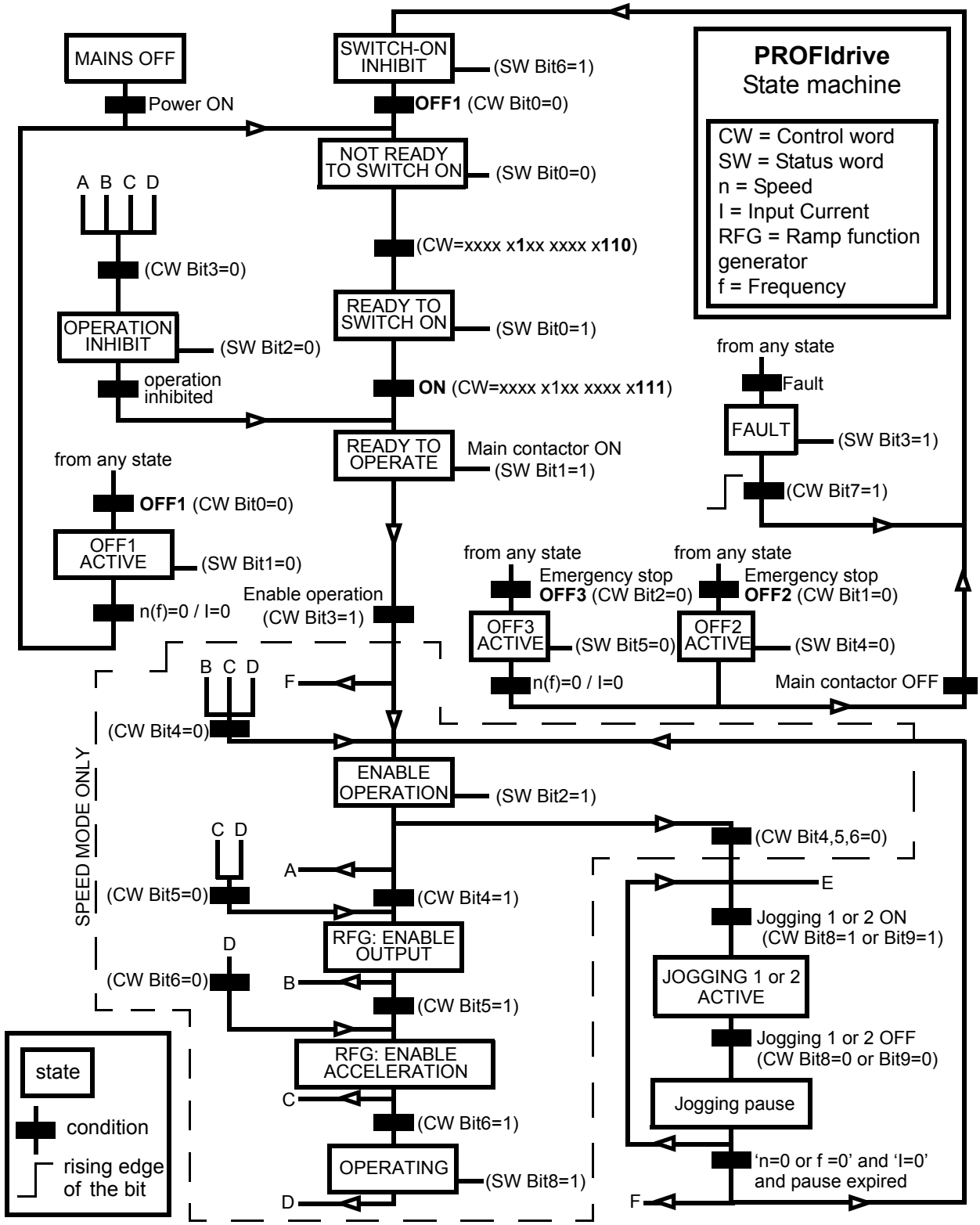
The table below shows the contents of the Status word for the PROFIdrive communication profile (PROFIdrive parameter 968). The upper case boldface text refers to the states shown in the state machine on page *88*.

Bit	Name	Value	STATE/Description	
			Speed control mode	Positioning mode
0	RDY_ON	1	**READY TO SWITCH ON**	
		0	**NOT READY TO SWITCH ON**	
1	RDY_RUN	1	**READY TO OPERATE**	
		0	**OFF1 ACTIVE**	
2	RDY_REF	1	**ENABLE OPERATION**	
		0	**DISABLE OPERATION**	
3	TRIPPED	1	**FAULT**	
		0	No fault	
4	OFF_2_STA	1	OFF2 inactive	
		0	**OFF2 ACTIVE**	
5	OFF_3_STA	1	OFF3 inactive	
		0	**OFF3 ACTIVE**	
6	SWC_ON_INHIB	1	**SWITCH-ON INHIBIT ACTIVE**	
		0	**SWITCH-ON INHIBIT NOT ACTIVE**	
7	ALARM	1	Warning/Alarm	
		0	No Warning/Alarm	
8	AT_SETPOINT	1	**OPERATING.** Actual value equals reference value (= is within tolerance limits).	
		0	Actual value differs from reference value (= is outside tolerance limits).	
9	REMOTE	1	Drive control location: REMOTE	
		0	Drive control location: LOCAL	

Bit	Name	Value	STATE/Description	
			Speed control mode	Positioning mode
10		1	Actual frequency or speed value equals or is greater than supervision limit.	Target position reached
		0	Actual frequency or speed value is within supervision limit.	Not at target position
11		1	Vendor-specific bit as defined by PROFIdrive parameter 939	Homing procedure was executed and is valid.
		0		No valid home position available
12		1	Vendor-specific bit as defined by PROFIdrive parameter 940	Traversing task acknowledgement (0 –> 1)
		0		
13		1	Vendor-specific bit as defined by PROFIdrive parameter 941	Drive stopped.
		0		Drive moving. Traversing task is executed (n <> 0).
14			Vendor-specific bit as defined by PROFIdrive parameter 942	
15			Vendor-specific bit as defined by PROFIdrive parameter 943	

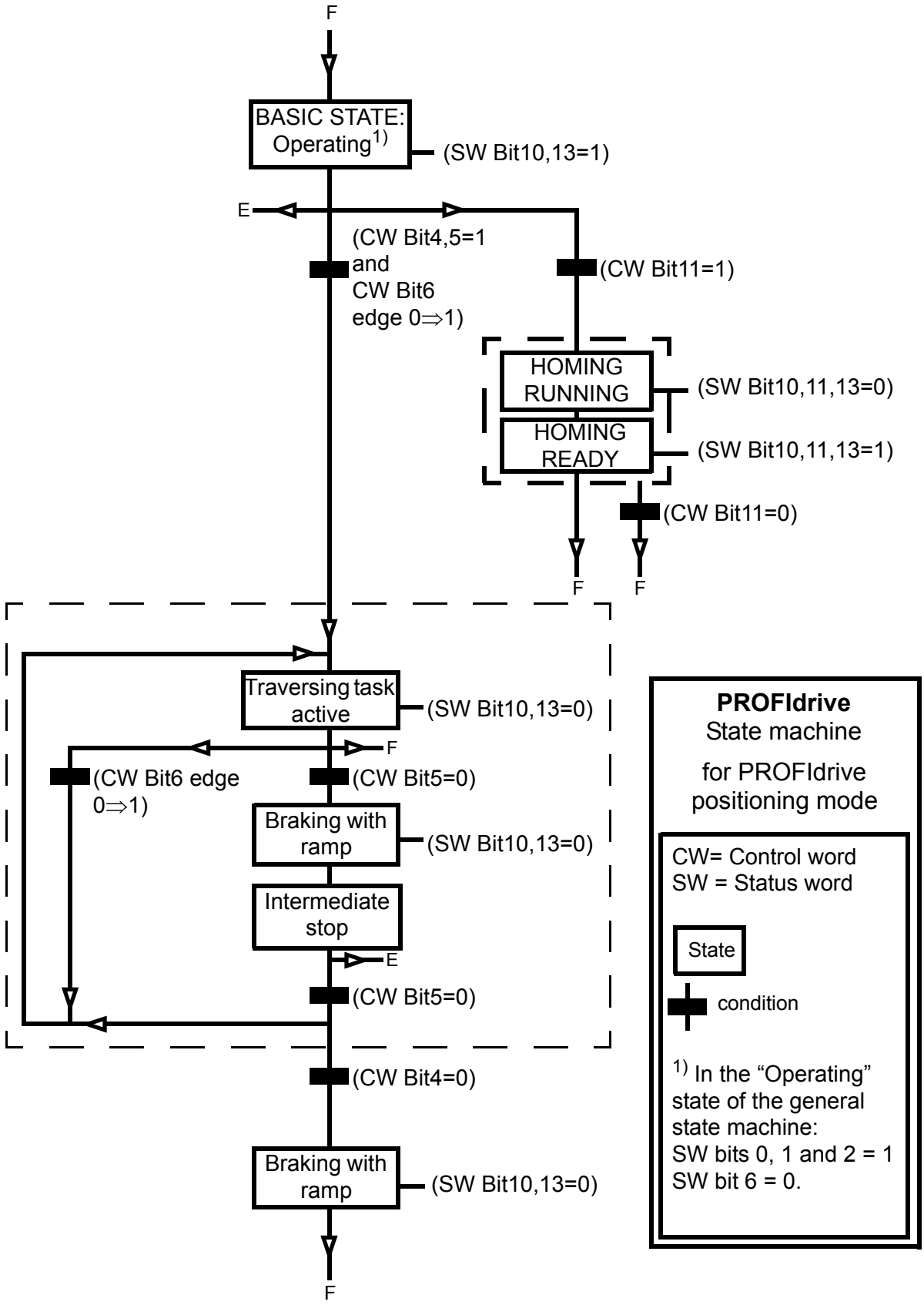
State machine for all operating modes

The general PROFIdrive state machine for all operating modes is shown below.



State machine for positioning mode

The PROFIdrive state machine for the positioning mode is shown below.



References

ABB drives can receive control information from multiple sources including analog and digital inputs, the drive control panel and a communication module (for example, FPBA-01). In order to have the drive controlled through PROFIBUS, the communication module must be defined as the source for control information, for example, reference.

References in speed control mode

In the speed control mode, references are 16-bit or 32-bit words containing a sign bit and a 15-bit or 31-bit integer. A negative reference (indicating reversed direction of rotation) is formed by calculating the two's complement from the corresponding positive reference.

A 16-bit speed reference (REF or NSOLL_A) in hexadecimal (0…4000h) corresponds to 0…100% of Maximum Reference (as defined with a drive parameter).

A 32-bit speed reference (NSOLL_B) in hexadecimal (0…4000 0000h) corresponds to 0…100% of Maximum Reference (as defined with a drive parameter).

References in positioning mode (ACSM1 only)

In the positioning mode, references are 16-bit or 32-bit words. A 32-bit reference contains a sign bit and a 31-bit integer. A negative reference (indicating reversed direction of rotation) is formed by calculating the two's complement from the corresponding positive reference.

For a 32-bit position reference (XSOLL_A), the unit and scaling are defined with drive parameters (for example, POS UNIT, POS2INT SCALE and FEED CONST).

For a 32-bit velocity reference (VELOCITY_A), the unit and scaling are defined with drive parameters (for example, POS SPEED UNIT and POS SPEED2INT).

Actual values

Actual values are 16-bit or 32-bit words containing information on the operation of the drive. The functions to be monitored are selected with a drive parameter.

Actual values in speed control mode

The scaling of 16-bit actual speed values (ACT or NIST_A) in hexadecimal (0…4000h) corresponds to 0…100% of Maximum Reference (as defined with a drive parameter).

The scaling of 32-bit actual speed values (NIST_B) in hexadecimal (0…4000 0000h) corresponds to 0…100% of Maximum Reference (as defined with a drive parameter).

Actual values in positioning mode (ACSM1 only)

For a 32-bit actual position value (XIST_A), the unit and scaling are defined with drive parameters (for example, POS UNIT, POS2INT SCALE and FEED CONST).

ABB Drives communication profile

Control word and Status word

The Control word is the principal means for controlling the drive from a fieldbus system. It is sent by the fieldbus master station to the drive through the adapter module. The drive switches between its states according to the bit-coded instructions in the Control word and returns status information to the master in the Status word.

The contents of the Control word and the Status word are detailed below. The drive states are presented on page *96*.

Control word contents

The table below shows the contents of the Control word for the ABB Drives communication profile. The upper case boldface text refers to the states shown on page *96*.

Bit	Name	Value	STATE/Description
0	OFF1_ CONTROL	1	Proceed to **READY TO OPERATE**.
		0	Stop along currently active deceleration ramp. Proceed to **OFF1 ACTIVE**; proceed to **READY TO SWITCH ON** unless other interlocks (OFF2, OFF3) are active.
1	OFF2_ CONTROL	1	Continue operation (OFF2 inactive).
		0	Emergency OFF, coast to stop. Proceed to **OFF2 ACTIVE**, proceed to **SWITCH-ON INHIBITED**.
2	OFF3_ CONTROL	1	Continue operation (OFF3 inactive).
		0	Emergency stop, stop within time defined by drive parameter. Proceed to **OFF3 ACTIVE**; proceed to **SWITCH-ON INHIBITED**. **Warning:** Ensure that motor and driven machine can be stopped using this stop mode.

Bit	Name	Value	STATE/Description
3	INHIBIT_ OPERATION	1	Proceed to **OPERATION ENABLED**. **Note:** Run enable signal must be active; see drive documentation. If the drive is set to receive the Run enable signal from the fieldbus, this bit activates the signal.
		0	Inhibit operation. Proceed to **OPERATION INHIBITED**.
4	RAMP_OUT_ ZERO	1	Normal operation. Proceed to **RAMP FUNCTION GENERATOR: OUTPUT ENABLED**.
		0	Force Ramp Function Generator output to zero. Drive ramps to stop (current and DC voltage limits in force).
5	RAMP_HOLD	1	Enable ramp function. Proceed to **RAMP FUNCTION GENERATOR: ACCELERATOR ENABLED**.
		0	Halt ramping (Ramp Function Generator output held).
6	RAMP_IN_ ZERO	1	Normal operation. Proceed to **OPERATING**. **Note:** This bit is effective only if the fieldbus interface is set as the source for this signal by drive parameters.
		0	Force Ramp Function Generator input to zero.
7	RESET	0 –> 1	Fault reset if an active fault exists. Proceed to **SWITCH-ON INHIBITED**. **Note:** This bit is effective only if the fieldbus interface is set as the source for this signal by drive parameters.
		0	Continue normal operation.
8…9	Reserved		

Bit	Name	Value	STATE/Description
10	REMOTE_ CMD	1	Fieldbus control enabled
		0	Control word and reference not getting through to the drive, except for CW bits OFF1, OFF2 and OFF3.
11	EXT_CTRL_ LOC	1	Select External Control Location EXT2. Effective if control location parameterized to be selected from fieldbus.
		0	Select External Control Location EXT1. Effective if control location parameterized to be selected from fieldbus.
12… 15	Drive-specific (For information, see the drive documentation.)		

Status word contents

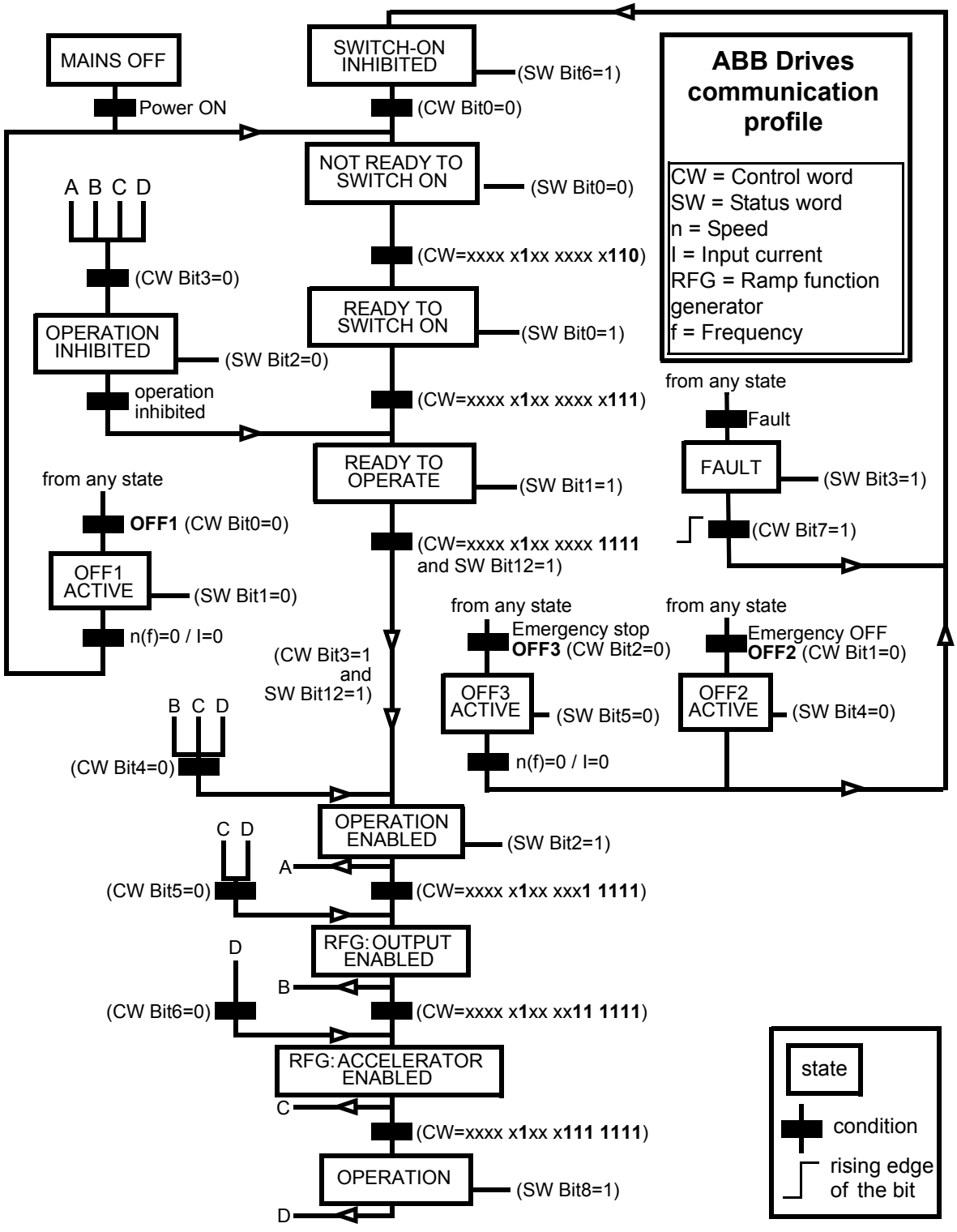
The table below shows the contents of the Status word for the ABB Drives communication profile. The upper case boldface text refers to the states shown on page *96*.

Bit	Name	Value	STATE/Description
0	RDY_ON	1	**READY TO SWITCH ON**
		0	**NOT READY TO SWITCH ON**
1	RDY_RUN	1	**READY TO OPERATE**
		0	**OFF1 ACTIVE**
2	RDY_REF	1	**OPERATION ENABLED**
		0	**OPERATION INHIBITED**
3	TRIPPED	1	**FAULT**
		0	No fault
4	OFF_2_STA	1	OFF2 inactive
		0	**OFF2 ACTIVE**
5	OFF_3_STA	1	OFF3 inactive
		0	**OFF3 ACTIVE.**
6	SWC_ON_ INHIB	1	**SWITCH-ON INHIBITED**
		0	–

Bit	Name	Value	STATE/Description
7	ALARM	1	Warning/Alarm
		0	No warning/alarm
8	AT_SETPOINT	1	**OPERATING.** Actual value equals reference (= is within tolerance limits, ie, in speed control, speed error is 10% max. of nominal motor speed).
		0	Actual value differs from reference (= is outside tolerance limits).
9	REMOTE	1	Drive control location: REMOTE (EXT1 or EXT2)
		0	Drive control location: LOCAL
10	ABOVE_ LIMIT	1	Actual frequency or speed equals or exceeds supervision limit (set by drive parameter). Valid in both directions of rotation.
		0	Actual frequency or speed within supervision limit
11	EXT_CTRL_ LOC	1	External Control Location EXT2 selected
		0	External Control Location EXT1 selected
12	EXT_RUN_ ENABLE	1	External Run Enable signal received
		0	No External Run Enable signal received
13… 14	Drive-specific (For information, see the drive documentation.)		
15	FBA_ERROR	1	Communication error detected by fieldbus adapter module
		0	Fieldbus adapter communication OK

State machine

The state machine for the ABB Drives communication profile is shown below.



References

References are 16-bit words containing a sign bit and a 15-bit integer. A negative reference (indicating reversed direction of rotation) is formed by calculating the two's complement from the corresponding positive reference.

ABB drives can receive control information from multiple sources including analog and digital inputs, the drive control panel and a communication module (for example, FPBA-01). In order to have the drive controlled through the fieldbus, the module must be defined as the source for control information, for example, reference.

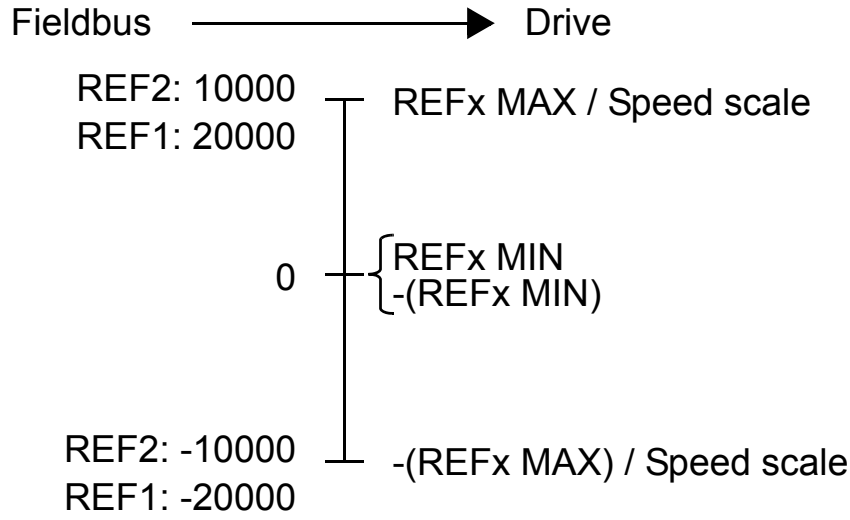
Scaling

References are scaled as shown below.

Note: The values of REF1 MAX and REF2 MAX are set with drive parameters. See the drive manuals for further information.

In ACSM1, ACS850, ACQ810 and ACS880, the speed reference (REFx) in decimal (0…20000) corresponds to 0…100% of the speed scaling value (as defined with a drive parameter, eg, ACS880 parameter 46.10 Speed scaling.)

In ACS355, drive parameter REFx MIN may limit the actual minimum reference.



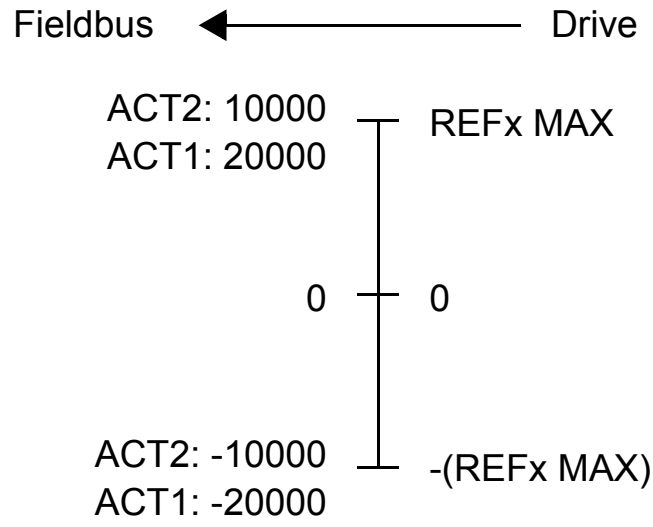
Actual values

Actual values are 16-bit words containing information on the operation of the drive. The functions to be monitored are selected with a drive parameter.

Scaling

Actual values are scaled as shown below.

Note: The values of REF1 MAX and REF2 MAX are set with drive parameters. See the drive manuals for further information.



8

Communication protocol

What this chapter contains

This chapter describes the PROFIBUS messaging used in the communication with the drive and in PROFIBUS slave device configuration messages.

PROFIBUS DP

The FPBA-01 module supports the PROFIBUS DP-V0 and DP-V1 protocols according to the IEC 61158, IEC 61784 and EN 50170 standards. PROFIBUS DP-V0/DP-V1 is a distributed I/O system which enables the master to use a large number of peripheral modules and field devices. The data transfer is mainly cyclic: the master reads the input information from the slaves and sends the output information back to the slaves.

The FPBA-01 module uses so-called PPOs (parameter/process data objects) in cyclic communication and also supports standard telegrams 1 and 2. See section *Cyclical message types* on page *114* for the supported PPO messages and standard telegrams.

Service access points (SAPs)

The services of the PROFIBUS Data Link Layer (Layer 2) are used by PROFIBUS DP through service access points (SAPs). Precisely defined functions are assigned to individual SAPs.

For further information on SAPs, refer to the manual of the PROFIBUS master, *PROFIDRIVE – The PROFIBUS Profile for Adjustable Speed Drives V2.0 and V3.1*, or the EN 50170 and IEC 61784 standards.

Communication start-up

The following service access points (SAPs) are used to initiate DP communication:

SAP no.	Short name	Name
Default SAP (0)	Data_Exch	Cyclical Data Exchange (Write_Read_Data)
58	Global_Control	Global Control Service
59	Get_Cfg	Read Configuration Data
60	Slave_Diag	Read Diagnostic Data
61	Set_Prm	Send Parameter Data
62	Chk_Cfg	Check Configuration Data

PROFIBUS SD2 telegram for Default SAP (0) and SAP 58-62

PROFIBUS typically uses SD2 telegrams for DP communication. The structure of an SD2 telegram is shown below.

DP header										DP trailer	
SD	**LE**	**LEr**	**SD**	**DA**	**SA**	**FC**	***DSAP**	***SSAP**	**DU**	**FCS**	**ED**
68h	x	x	68h	xx	xx	x	xx	xx	x…	xx	16h

SD = Start delimiter
LE = Length
LEr = Length repeated
DA = Destination address
SA = Source address
FC = Function code
*DSAP = Destination service access point
*SSAP = Source service access point
DU = Data unit for DP services
FCS = Frame checking sequence
ED = End delimiter

***Not present with Default SAP (0)**

Data unit
See the descriptions of each SAP on the following pages.

Default SAP (SAP 0) (Data_Exchange)

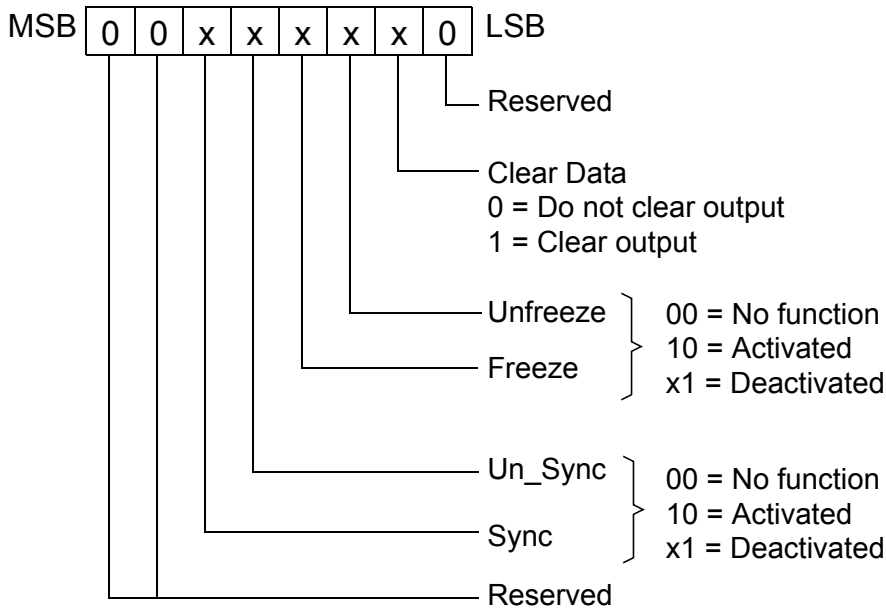
This SAP allows the master to send output data to a slave station and to simultaneously request input data from the same station.

Outp_Data (Output Data) DU length: 4 to 32 bytes (depending on the selected PPO message or standard telegram type)
Inp_Data (Input Data) DU length: 4 to 32 bytes (depending on the selected PPO message or standard telegram type)

In addition to Default SAP, any master can read the I/O data of any slave at any time using the “Read_Inputs” (SAP 56) and “Read_Outputs” (SAP 57) telegrams. These telegrams have otherwise the same structure as the cyclic Data_Exchange telegram, but include the DSAP and SSAP bytes. In these telegrams, the MSB of the DA and SA bytes is set to 1 to indicate that a DSAP/SSAP byte follows in the telegram header. For more information, see section *PROFIBUS SD2 telegram for Default SAP (0) and SAP 58-62* on page *101*.

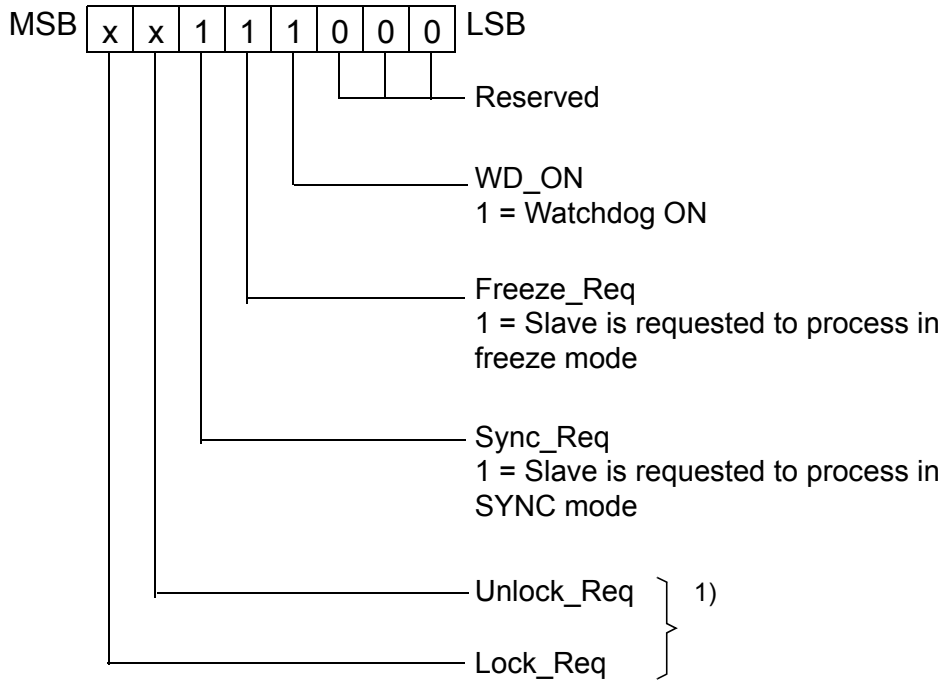
SAP 58 (Global_Control)

This SAP is used to send special commands addressed to a single slave, a special group of slaves, or all slaves at once (broadcast).

<table>
<tr><td colspan="2">Global_Control
Type: Octet String - Length: 2</td></tr>
<tr><th>DU Byte</th><th>Description</th></tr>
<tr><td>0</td><td>GC_Command
 
</td></tr>
<tr><td>1</td><td>Group_Select
0…255. The value must match the Group Identification number of SAP 61 (DU Byte 6).</td></tr>
</table>

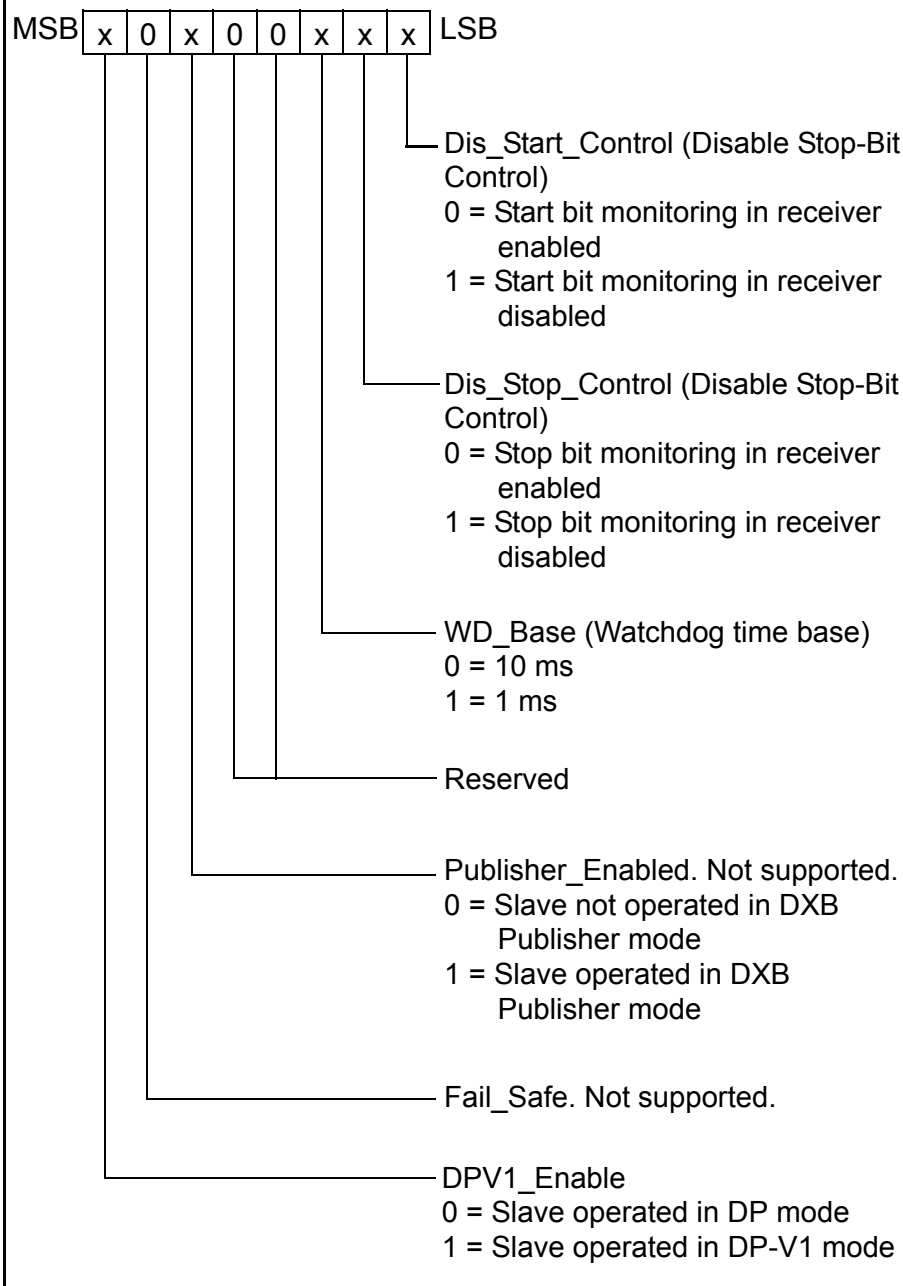
SAP 61 (Set_Prm)

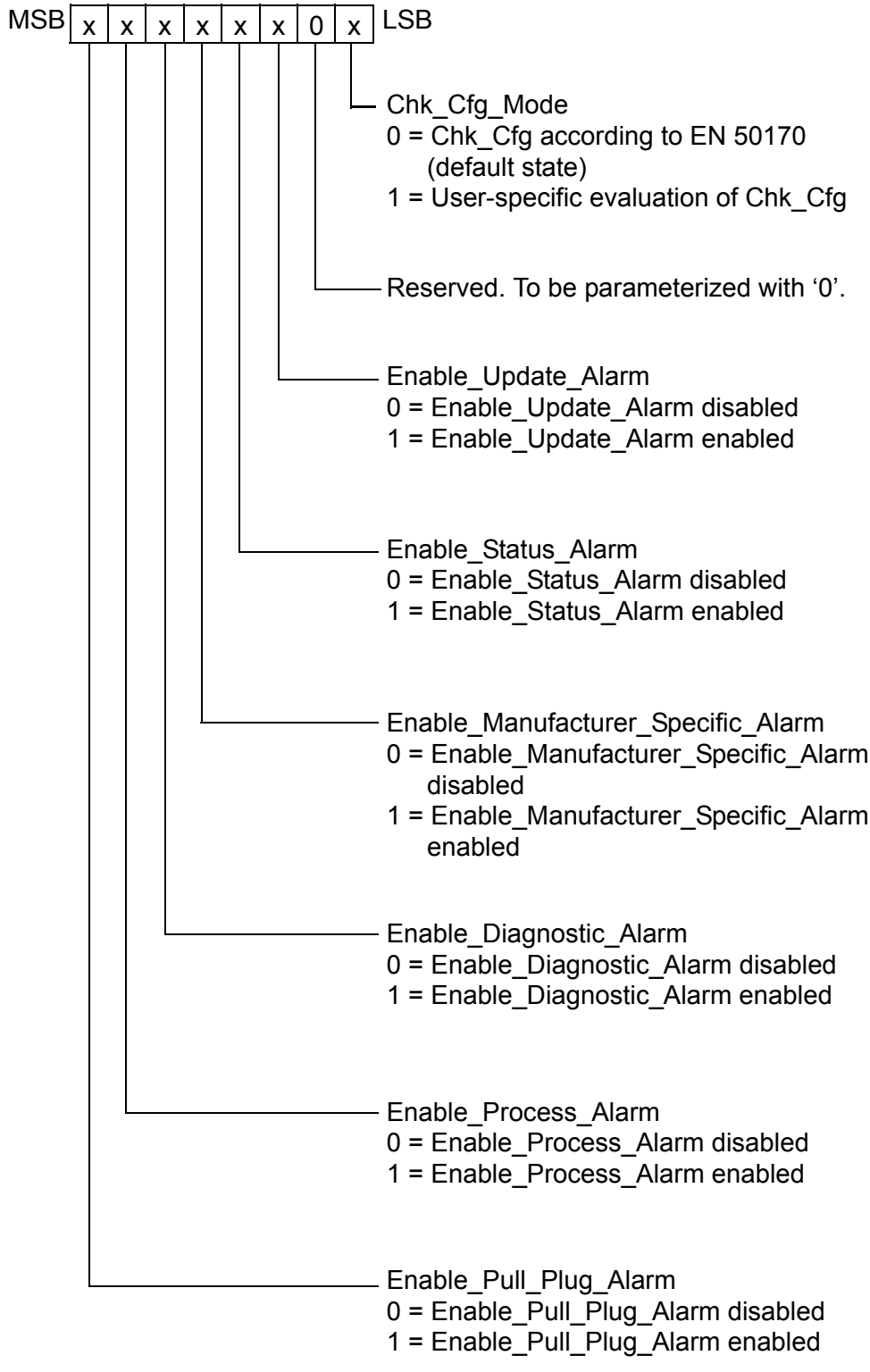
This SAP is used in the parameterization of the drive.

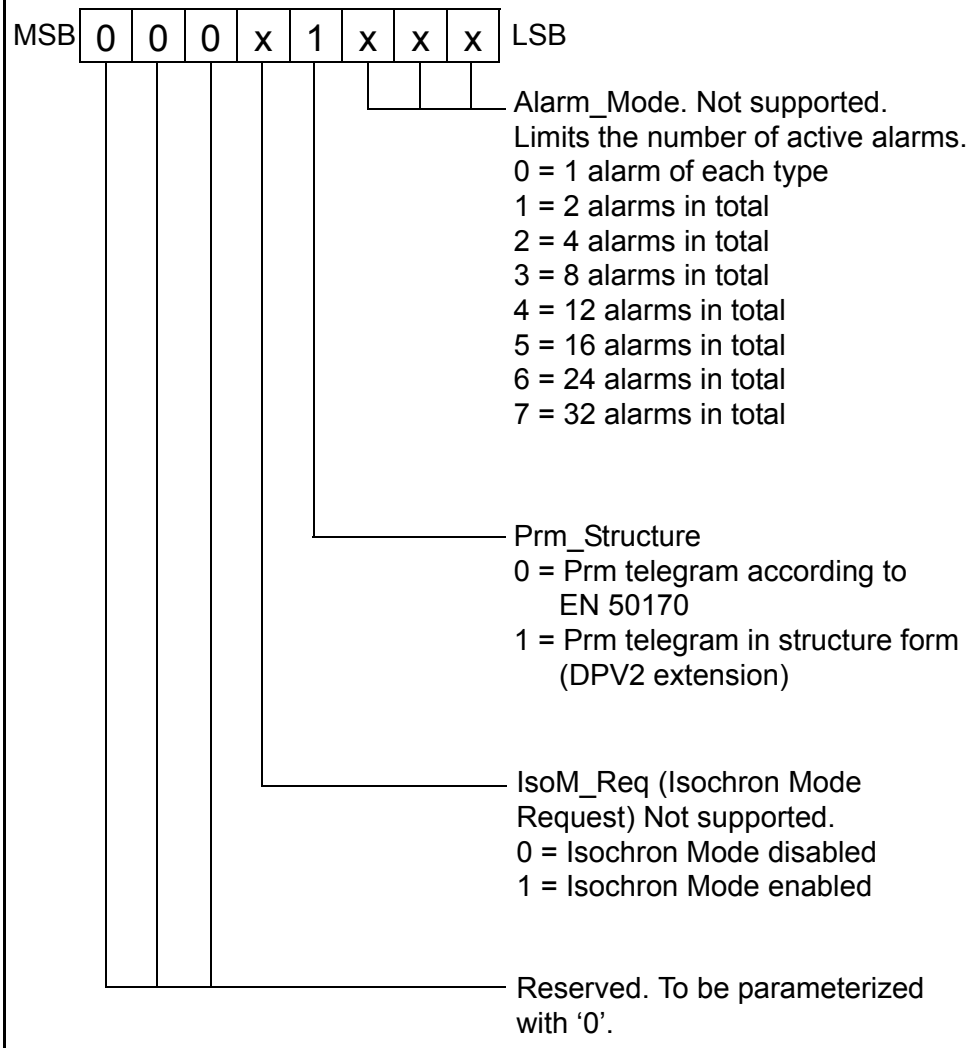
<table>
<tr><td colspan="3">Prm_Data (Parameter Data Standard)
Type: Octet String
Total length: 37 – Prm_Data length: 14 – User_Prm_Data length: 23</td></tr>
<tr><th>DU Byte</th><th>Value</th><th>Description</th></tr>
<tr><td>0</td><td>B8h
(Recom-mended default value)</td><td>Station status
 

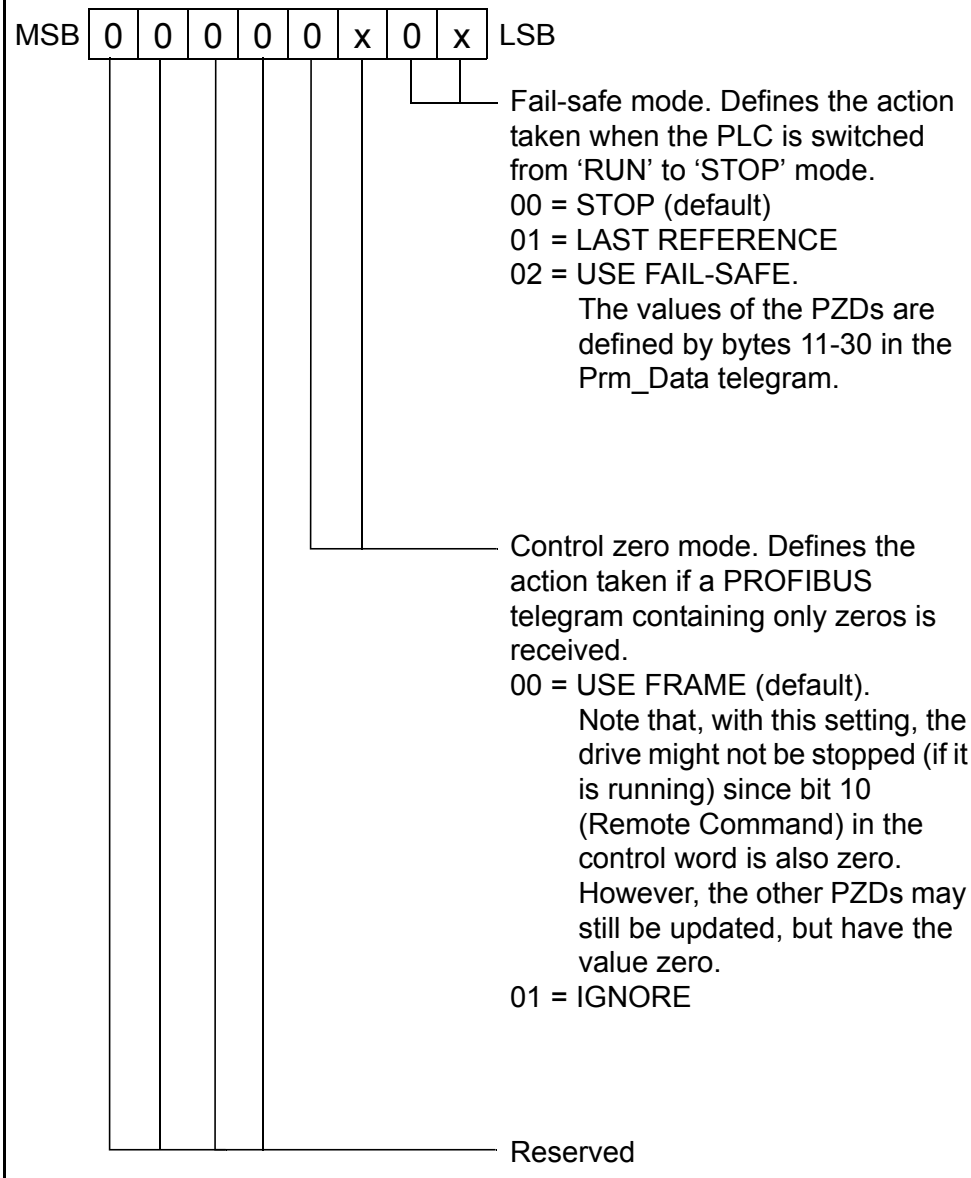
1) 00 = Min TSDR and slave-related parameters may be overwritten.
10 = Slave locked for other masters. All parameters can be carried over.
x1 = Slave released for other masters</td></tr>
<tr><td>1…2</td><td></td><td>WD_Fact_1 and WD_Fact_2 – Watchdog Factors 1 and 2 (set by the PROFIBUS master)
WdFactor1 × WdFactor2 × 10 ms = monitoring time of the slave to verify that the master is still active</td></tr>
<tr><td>3</td><td>0Bh
(Default)</td><td>MinTSDR – Minimum Station Delay Respond Time
Time after which a slave station is allowed to send response frames to the master. Calculated by multiplying the hex value with t_{Bit} (time required for transmitting one bit).</td></tr>
<tr><td>4…5</td><td>0959h</td><td>Vendor Identification (for FPBA-01: 0959h)</td></tr>
</table>

6	00h	Group Identification
7		**DPV1_Status_1** (DP-V1 only)


MSB
x 0 x 0 0 x x x
LSB
Dis_Start_Control (Disable Stop-Bit Control)
0 = Start bit monitoring in receiver enabled
1 = Start bit monitoring in receiver disabled
Dis_Stop_Control (Disable Stop-Bit Control)
0 = Stop bit monitoring in receiver enabled
1 = Stop bit monitoring in receiver disabled
WD_Base (Watchdog time base)
0 = 10 ms
1 = 1 ms
Reserved
Publisher_Enabled. Not supported.
0 = Slave not operated in DXB Publisher mode
1 = Slave operated in DXB Publisher mode
Fail_Safe. Not supported.
DPV1_Enable
0 = Slave operated in DP mode
1 = Slave operated in DP-V1 mode

8		**DPV1_Status_2** (DP-V1 only) (Not supported) 

<table>
<tr><td>9</td><td></td><td>DPV1_Status_3 (DP-V1 only)
 
</td></tr>
<tr><td>10</td><td>1Bh
(Default)</td><td>Structured_Length
Length of the structured Prm telegram. (User parameter length is 23 bytes + 4 header bytes.)</td></tr>
<tr><td>11</td><td>81h</td><td>Structure_Type
129: USER_PRM_DATA</td></tr>
<tr><td>12</td><td>0</td><td>Slot_Number
Set to 0</td></tr>
<tr><td>13</td><td>0</td><td>Reserved</td></tr>
</table>

User_Prm_Data (Parameter Data Extended) Type: Octet String - Length: 23		
14	00h (Default)	Header byte 
15… 16	0… 65536	Cut off time out in milliseconds. 0 = Cut off disabled.
17… 18	0… 65536	Fail-safe, PZD1 (typically CW)
19… 20	0… 65536	Fail-safe, PZD2 (typically REF)
21… 22	0… 65536	Fail-safe, PZD3
23… 24	0… 65536	Fail-safe, PZD4

25… 26	0… 65536	Fail-safe, PZD5
27… 28	0… 65536	Fail-safe, PZD6
29… 30	0… 65536	Fail-safe, PZD7
31… 32	0… 65536	Fail-safe, PZD8
33… 34	0… 65536	Fail-safe, PZD9
35… 36	0… 65536	Fail-safe, PZD10

The extended parameter data bytes are configured via the PROFIBUS network configuration tool. The functions are defined in the GSD file.

SAP 62 (Chk_Cfg)

With this telegram, the master sends the selected data exchange (Write_Read_Data) telegram type code to the slave. The table below gives the typical hexadecimal values (DU Byte 0…n) that are sent to the drive in order to select the PPO type or standard telegram (ST).

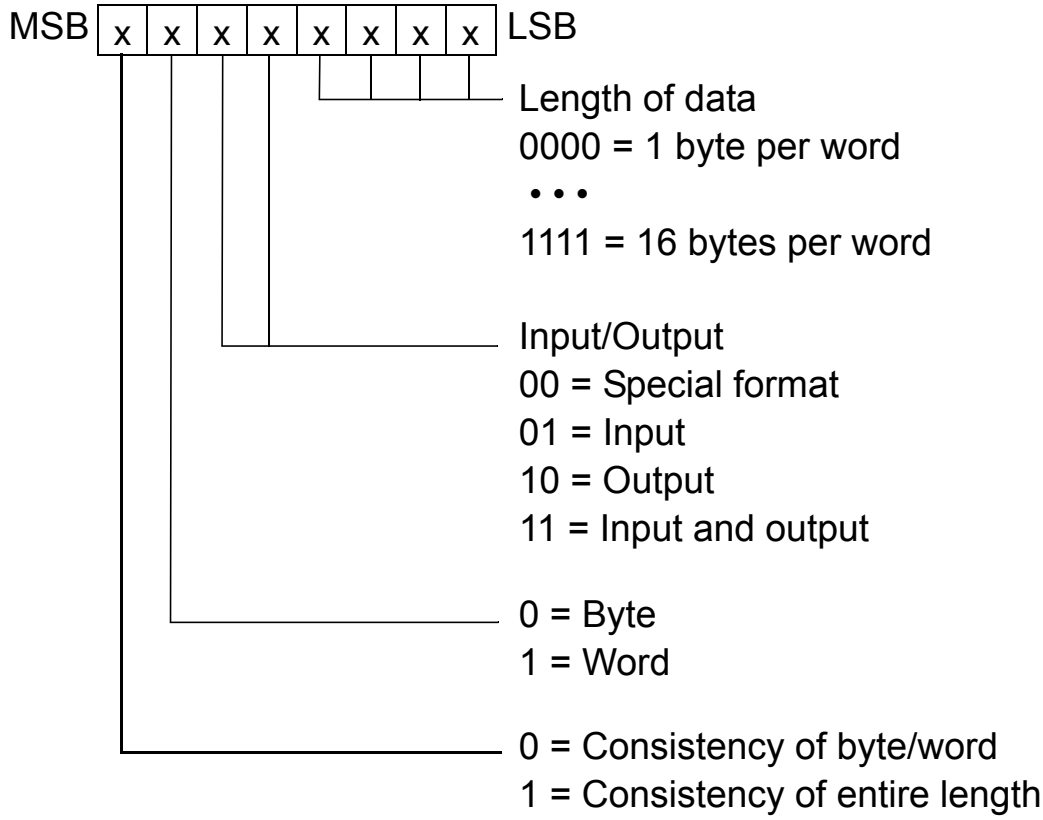
Telegram name	Cyclical telegram length (in words)	Default code for message type (see figure below)	Supported parameter channel access mode
PPO 1	4 PKW + 2 PZD in/out	F3 F1	DP-V0 / DP-V1[1)]
PPO 2	4 PKW + 6 PZD in/out	F3 F5	DP-V0 / DP-V1[1)]
PPO 3	0 PKW + 2 PZD in/out	F1	DP-V1[1)]
PPO 4	0 PKW + 6 PZD in/out	F5	DP-V1[1)]
PPO 5	4 PKW + 10 PZD in/out	F3 F9	DP-V0 / DP-V1[1)]
PPO 6	0 PKW + 10 PZD in/out	F9	DP-V1[1)]

Telegram name	Cyclical telegram length (in words)	Default code for message type (see figure below)	Supported parameter channel access mode
PPO 7	4 PKW + 12 PZD in/out	0xF3, 0xFB	DP-V0 / DP-V1[1)]
PPO 8	0 PKW + 12 PZD in/out	0xFB	DP-V1[1)]
ST 1	2 PZD in / 2 PZD out	C3 C1 C1 FD 00 01	DP-V1
ST 2	4 PZD in / 4 PZD out	C3 C3 C3 FD 00 02	DP-V1

[1)] DP-V1 mode selected by the user.

PKW: “Parameter-Kennung-Wert” (Parameter ID value)
PZD: “Prozeßdaten” (Process data, cyclically transferred)

The default codes for the PPO types in the table above define data consistency over the message as follows:



For example, 11110001 = F1 = PPO3

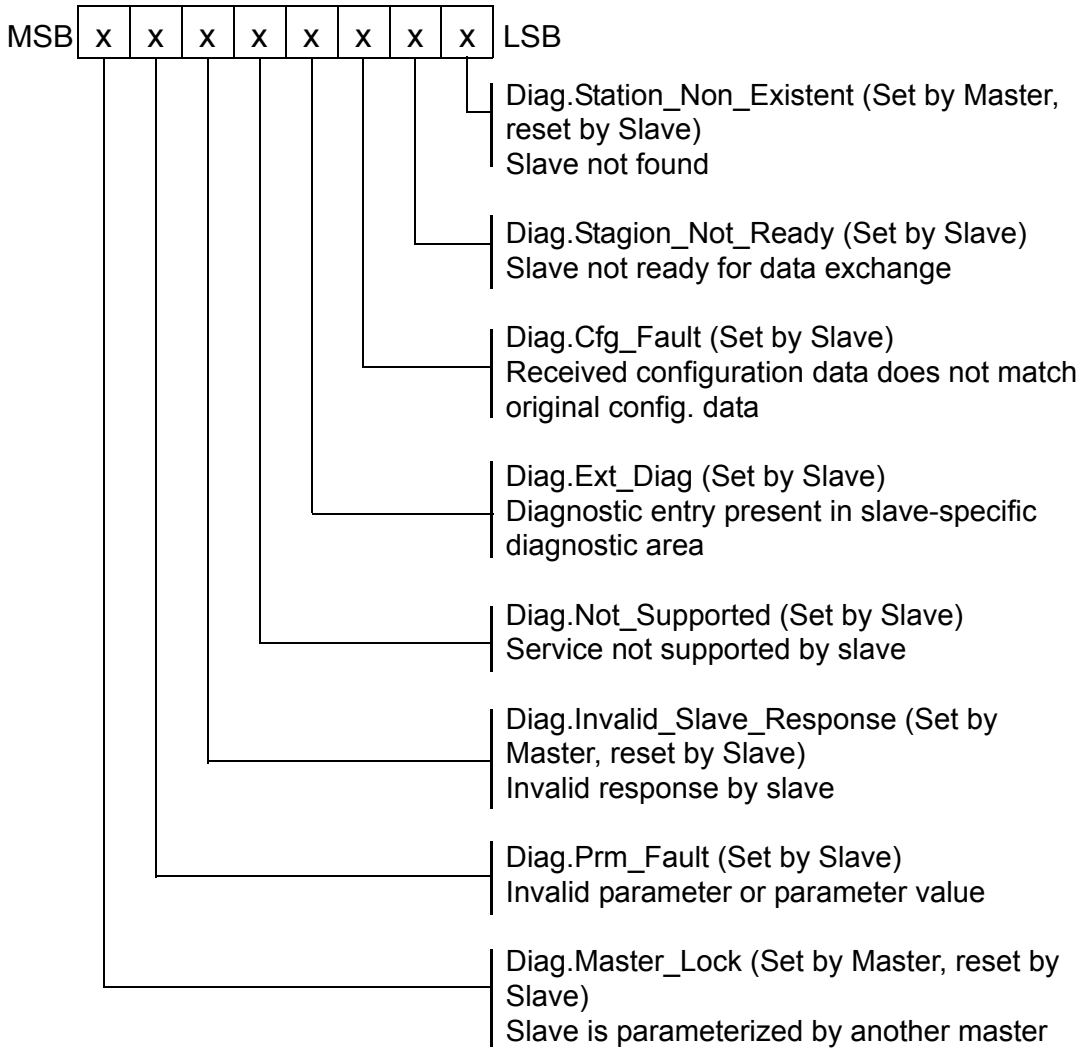
Data non-consistent over the entire message is also supported by the FPBA-01 module. The cyclical frame types supported by the module are defined in the GSD file.

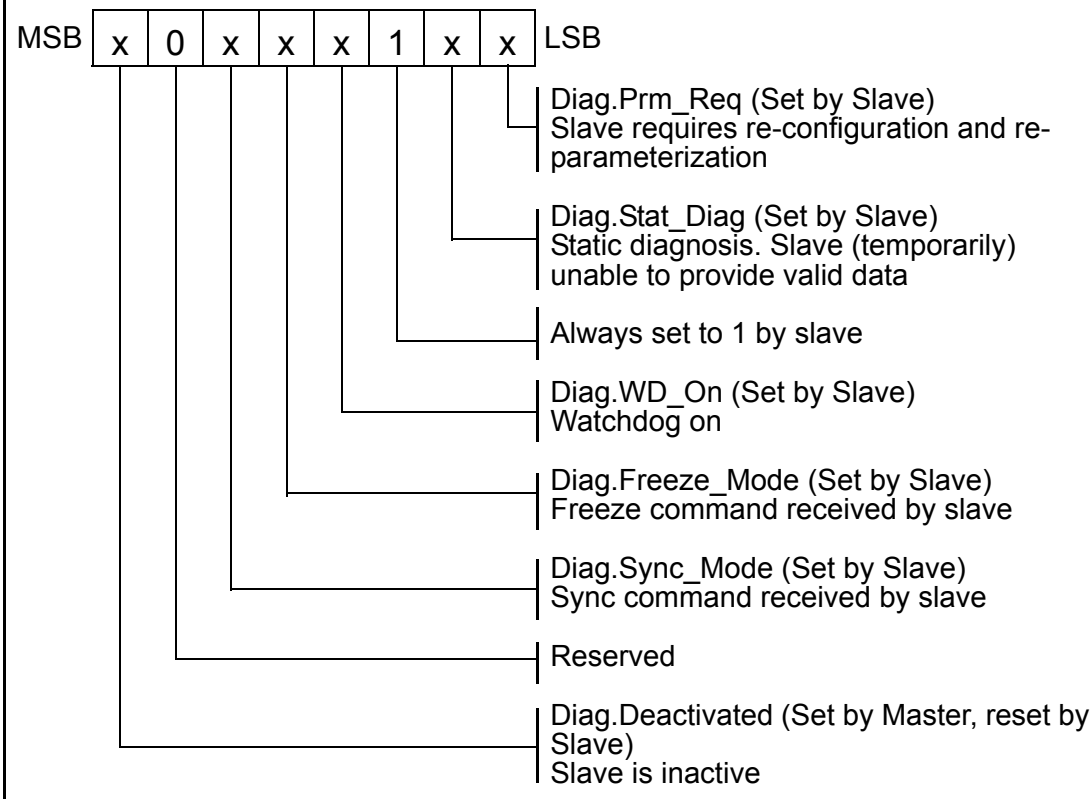
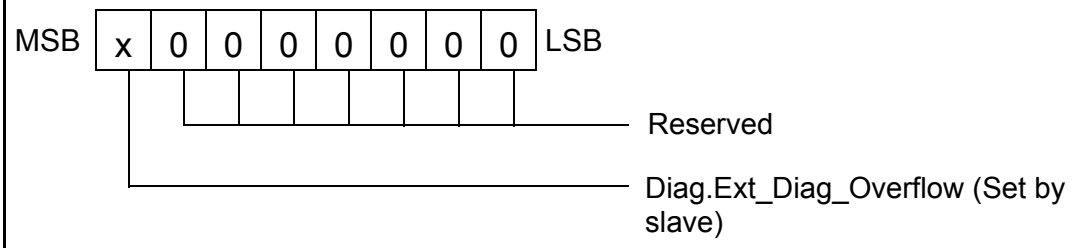
SAP 60 (Slave_Diag)

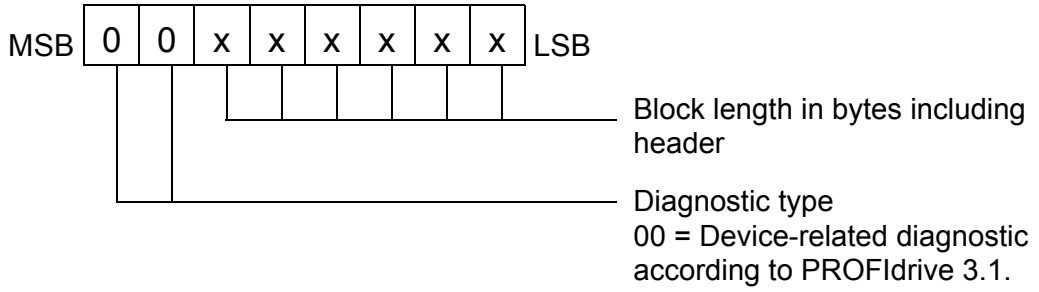
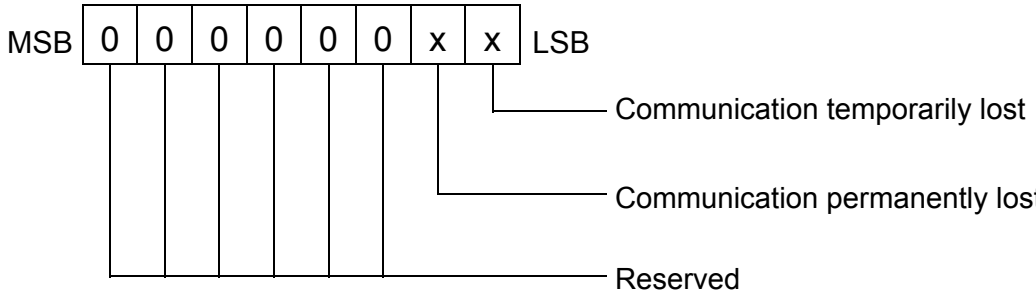
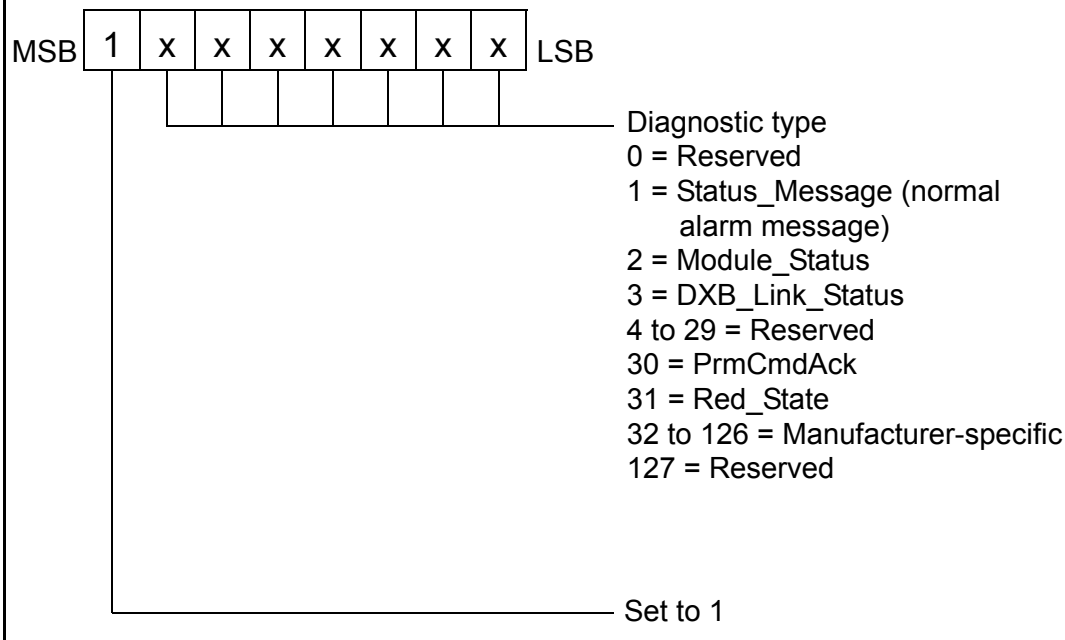
This SAP gives diagnostic information on the slave station.

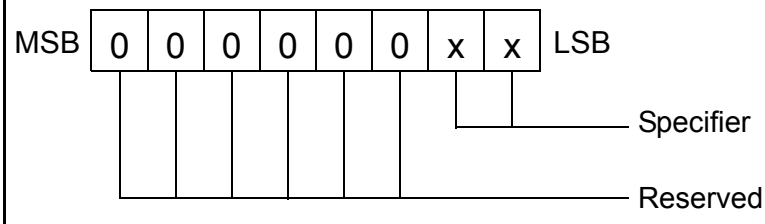
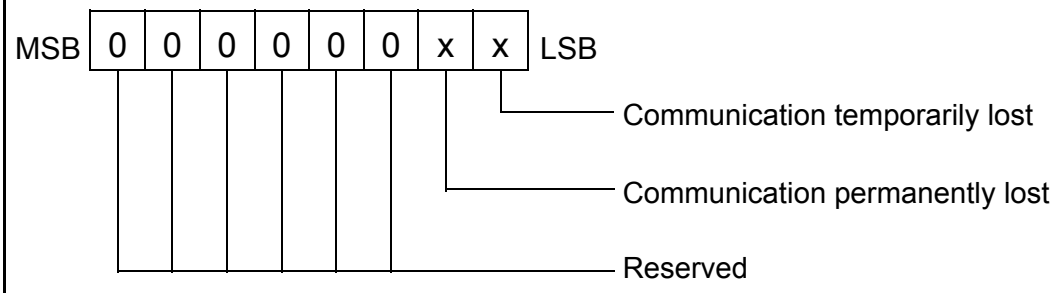
Diag_Data (Diagnostic Data)
Type: Octet String - Length: 6 (Standard)
+ 2 (Extended Diagnosis) (DP-V0 mode)
+ 5 (Extended Diagnosis) (DP-V1 mode)
Note: During initialization, the module only sends the standard part of the message.

DU Byte	Description
0	**Station_Status_1**


MSB x x x x x x x x LSB
Diag.Station_Non_Existent (Set by Master, reset by Slave)
Slave not found
Diag.Stagion_Not_Ready (Set by Slave)
Slave not ready for data exchange
Diag.Cfg_Fault (Set by Slave)
Received configuration data does not match original config. data
Diag.Ext_Diag (Set by Slave)
Diagnostic entry present in slave-specific diagnostic area
Diag.Not_Supported (Set by Slave)
Service not supported by slave
Diag.Invalid_Slave_Response (Set by Master, reset by Slave)
Invalid response by slave
Diag.Prm_Fault (Set by Slave)
Invalid parameter or parameter value
Diag.Master_Lock (Set by Master, reset by Slave)
Slave is parameterized by another master

<table>
<tr><td>1</td><td>Station_Status_2
 
</td></tr>
<tr><td>2</td><td>Station_Status_3
 
</td></tr>
<tr><td>3</td><td>Diag.Master_Add
The address of the master that parameterized this slave</td></tr>
<tr><td>4…5</td><td>Ident_Number (for FPBA-01: 0959h)</td></tr>
<tr><td>6[2)]</td><td>Ext_Diag_Data (0x02) (DP-V0 only)
The number of bytes (including this byte) reserved for Extended Diagnosis</td></tr>
</table>

<table>
<tr><td>6[1)]</td><td>Header Byte (DP-V1 only)
The complete header consists of 5 bytes with FPBA-01.
 
</td></tr>
<tr><td>7[2)]</td><td>Communication Diagnostic (DP-V0 only)
 
</td></tr>
<tr><td>7[1)]</td><td>Status Type = Status Message (0x81) (DP-V1 only)
 
</td></tr>
<tr><td>8[1)]</td><td>Slot Number (0x00) (DP-V1 only)
Slot Number (0…244).</td></tr>
</table>

9[1)]	Specifier (0x00) (DP-V1 only) 
10[1)]	Communication Diagnostic (DP-V1 only) 

1) The FPBA-01 module is operated in the DP-V1 mode. The diagnostic information is according to PROFIdrive 3.1.

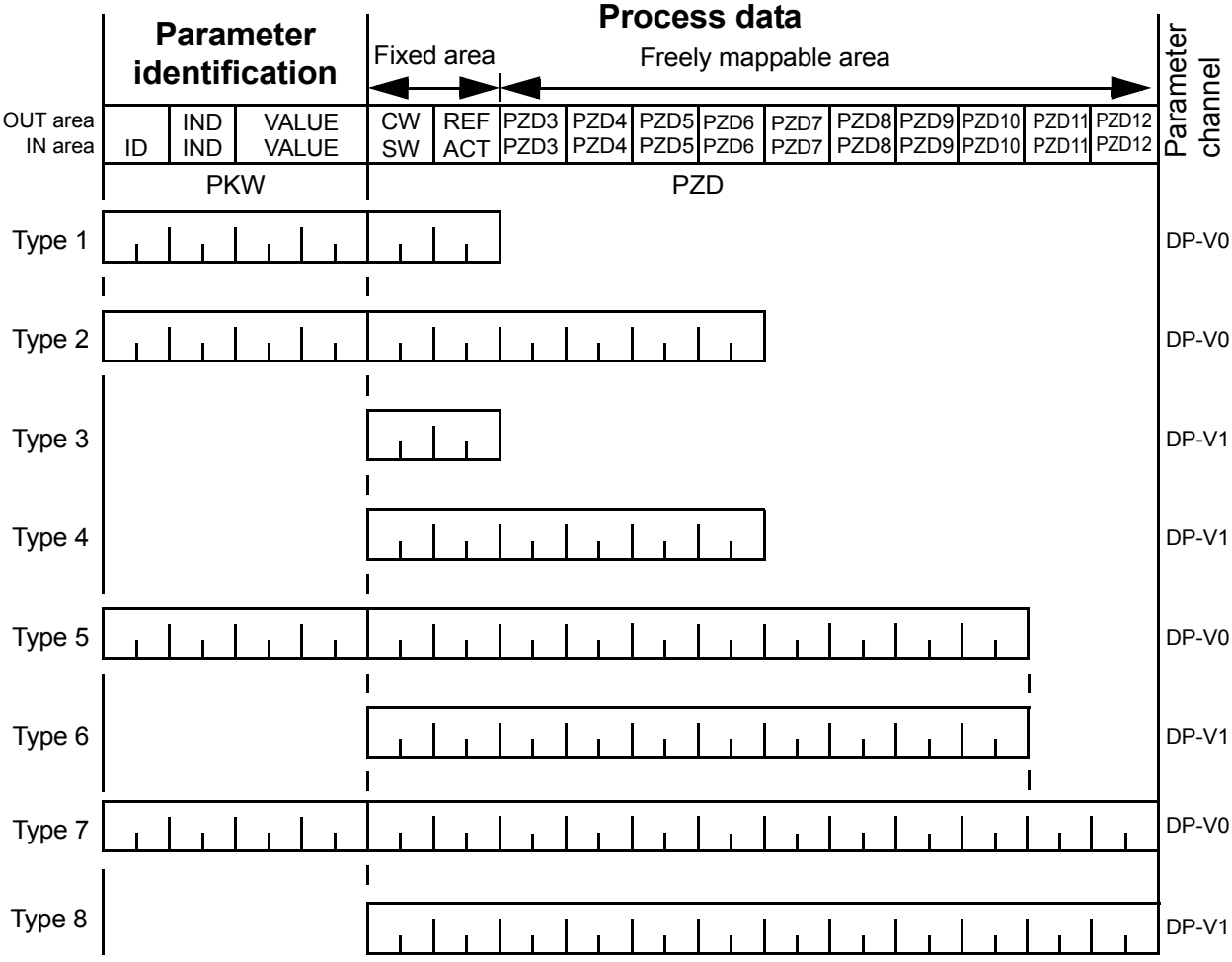
2) The FPBA-01 module is operated in the DP-V0 (DP) mode. The diagnostic information is according to PROFIdrive 2.0.

Other SAPs for DP-V1 communication

Master class	Master SAP	Slave SAP	Short name	Meaning
C1	51	51	Server SAP	Read, Write, Alarm
C1	51	50	Alarm SAP	Alarm
C2	50	49	Resource Mgmt. SAP	Req PDU
C2	50	48...0	Communication SAP	Abort, Read/Write, Data_Transfer
C2	62	55	Set_Slave_Add	Change Station Address (C2 Master)

Cyclical message types

PPO types



OUT area – Data sent from master to slave (control data)
IN area – Data sent from slave to master (actual data)
Parameter identification:
ID – Parameter identification
IND – Index for arrays
VALUE – Parameter value (Max. 4 bytes)
PKW – Parameter ID/value
Process data:
CW – Control word
SW – Status word
REF – Reference
ACT – Actual value
PZD – Process data (application-specific)
DW – Data word

Standard telegram (ST) types (DP-V1)

ST1

	PZD1	**PZD2**
OUT area	STW1 Control word 1	NSOLL_A Speed set point A
IN area	ZSW1 Status word 1	NIST_A Speed actual value A

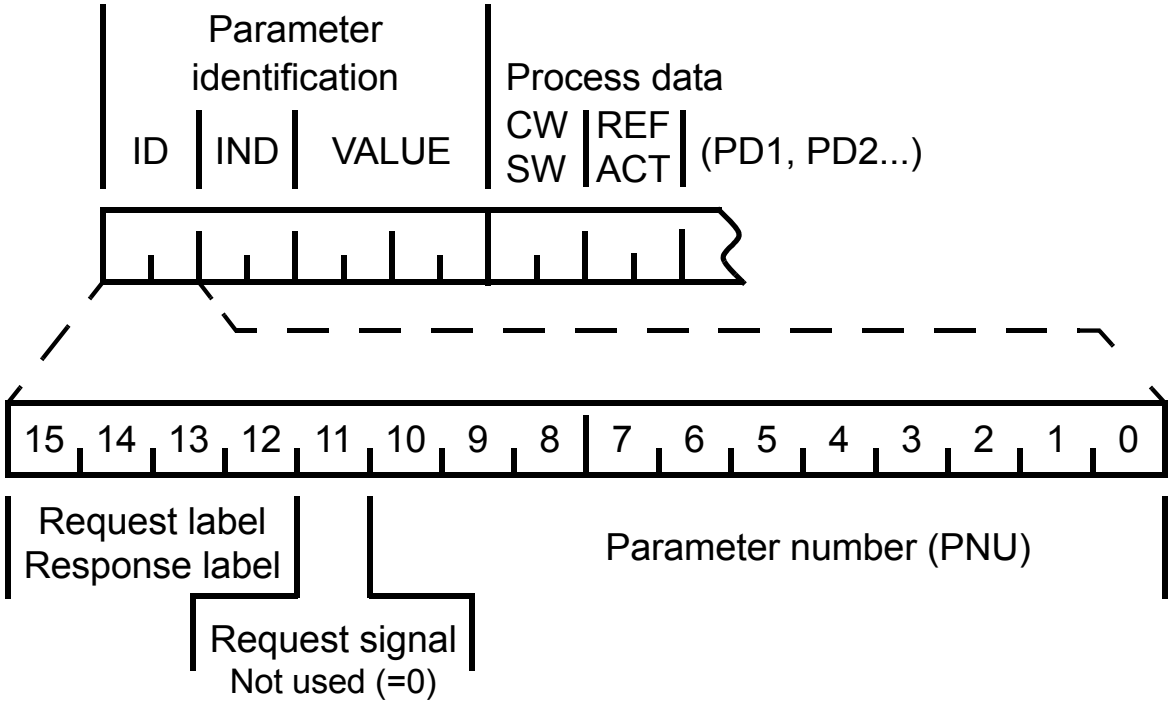
ST2

	PZD1	**PZD2…3**	**PZD4**
OUT area	STW1 Control word 1	NSOLL_B Speed set point B	STW2 Control word 2
IN area	ZSW1 Status word 1	NIST_B Speed actual value B	ZSW2 Status word 2

Note: For the contents of the Control word, the Status word, references and actual values, see chapter *Communication profiles*.

Parameter handling in cyclic communication (DP)

In cyclic PROFIBUS DP communication, parameter data is transferred in PPO message types 1, 2 and 5, as shown in section *PPO types* on page *114*. The parameter identification part consists of eight bytes, as shown below.



The Request label is used by the master when transmitting data to the slave, while the Response label is used by the slave as a positive or negative acknowledgement. The tables below show the Request/Response functions.

Request labels (from master to slave)			
Request	**Function**	**Response labels**	
		Ackn. (+)	**Ackn. (-)**
0	No task	0	–
1	Request parameter value	1, 2	7
2	Change parameter value (word)	1	7, 8
3	Change parameter value (double word)	2	7, 8
4	Request description element	3	7
5	Change description element	3	7, 8
6	Request parameter value (array)	4, 5	7, 8

Request labels (from master to slave)			
Request	**Function**	**Response labels**	
		Ackn. (+)	**Ackn. (-)**
7	Change parameter value (array word)	4	7, 8
8	Change parameter value (array double word)	5	7, 8
9	Request number of array elements	6	7

Response label (Acknowledgement from slave to master)	
Ackn.	**Function**
0	No response
1	Transfer parameter value (word)
2	Transfer parameter value (double word)
3	Transfer description element
4	Transfer parameter value (array word)
5	Transfer parameter value (array double word)
6	Transfer number of array elements

Response label (Acknowledgement from slave to master)	
Ackn.	**Function**
7	Task cannot be executed, followed by error number 0 = Illegal parameter number 1 = Parameter value cannot be changed 2 = Lower or upper limit violated 3 = Erroneous subindex 4 = No array 5 = Incorrect data type 6 = Setting not allowed (can only be reset) 7 = Descriptive element cannot be changed 9 = Descriptive data not available 11 = No parameter change rights 15 = Text array not available 17 = Task cannot be executed due to operating status (eg, parameter is currently read-only) 18 = Other error 101 = Vendor-specific error 102 = Request not supported 103 = Request cannot be completed due to communication error 110 = Failure during write to non-volatile memory 111 = Request aborted due to time-out 120 = Parameter cannot be mapped to PZD (size mismatch or non-existent) 121 = Parameter cannot be mapped to PZD (end of memory) 122 = Parameter cannot be mapped to PZD (multiple PZD write) 130 = Cannot map Control word bit (parameter 933…937, eg, double mapping of bits) 140 = Cannot change mode to TORQUE (frequency is used) 150 = Internal buffer overflow 160 = Internal communication error
8	No parameter change rights for PKW interface
9	Parameter data signal (word)
10	Parameter data signal (double word)

The allocation of drive control/actual words, drive parameters and PROFIdrive parameters to the parameter identification part of the PPO type is shown below.

- The **Index** column corresponds to the parameter number (PNU) in the ID part of parameter identification.
- The **Sub-index** column corresponds to the IND part of parameter identification.
- The **Example No.** column refers to the examples on the following pages.

Virtual drive control area					
Index	**Sub-index**	**Par. No. (Decimal)**	**Request label**		**Example. No.**
0h	1h	1	R/W	6/7/8[1)]	1, 2
0h	2h	2			
• • •					
0h	63h	99			

[1)] Supported with an ACSM1 drive only

Drive parameters					
Index	**Sub-index**	**Par. No. (Decimal)**	**Request label**		**Example No.**
1	1	101	R/W	6/7/8[1)]	1, 2
1	2	102			
• • •					
63h	63h	9999			

[1)] Supported with an ACSM1 drive only

PROFIdrive parameters						
Index	**Sub-index**	**Par. No (Decimal)**		**Request label**		**Example No.**
393h	2h	915	2	R/W	6/7	6
	3h		3			
	• • •		• • •			
	9h		9			
394h	2h	916	2	R/W	6/7	7
	3h		3			
	• • •		• • •			
	9h		9			
396h	0h	918		R/W	1/2	3, 4
• • •						
3B3h	0h	947	1	R	6	5
	9h		9			
	11h		17			
	19h		25			
	21h		33			
	29h		41			
• • •						
3CCh	0h	972		R/W	1/2	3, 4

For a complete PROFIdrive parameter list, see *Appendix A – PROFIdrive parameters*.

Note: Continuous (cyclic) writing of PROFIdrive parameters should be avoided as the values of these parameters are stored in the flash memory of the adapter module. The estimated lifetime of the flash memory is 100,000 program/erase cycles, and continuous writing will cause the memory to fail prematurely.

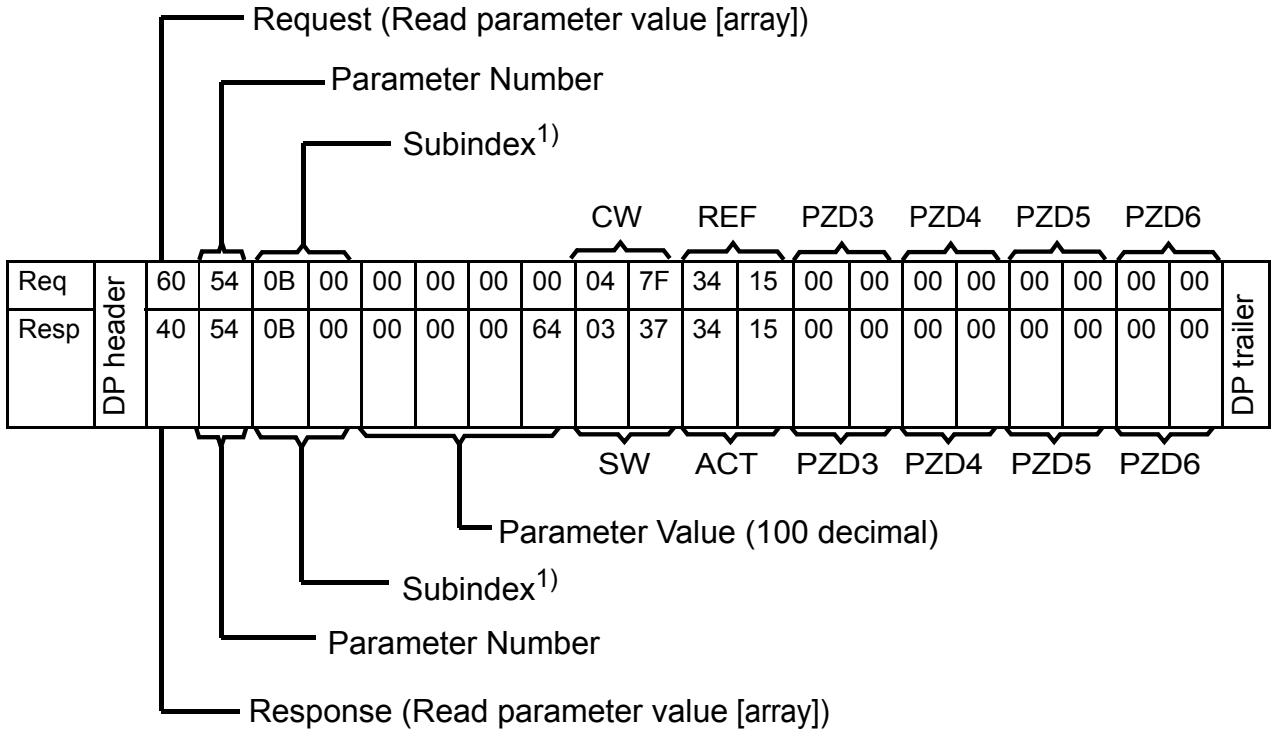
Parameter data transfer examples (DP-V0)

Note: Only the ‘data unit’ part of the telegram is presented in the examples. See section *PROFIBUS SD2 telegram for Default SAP (0) and SAP 58-62* on page *101*.

Example 1: Reading a drive parameter (or data set)

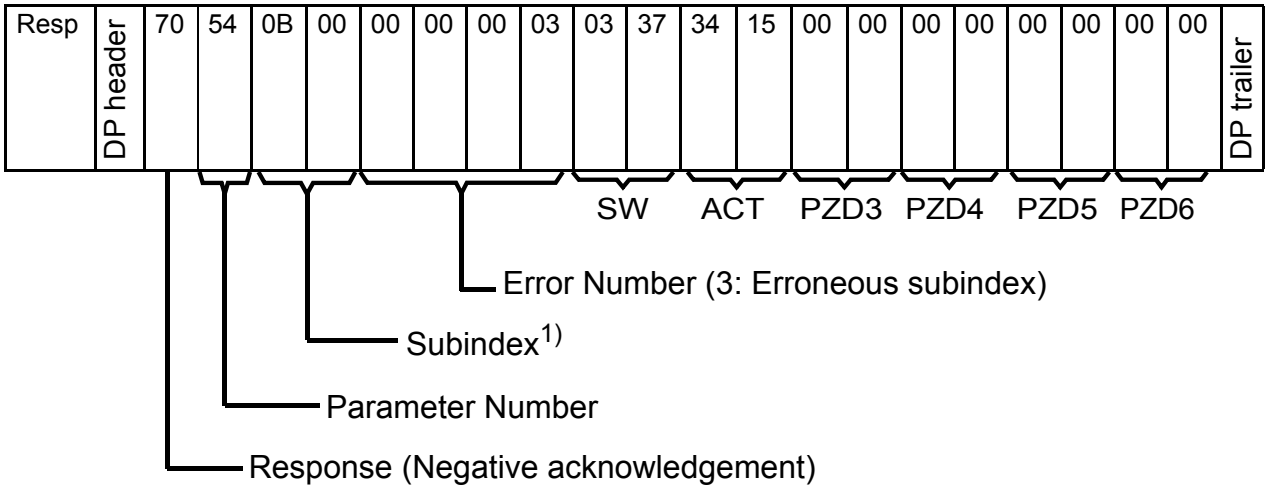
To determine the parameter number and subindex for drive parameter reading, convert the drive parameter group number and the parameter index number to hexadecimal. The index number is the *Subindex* (IND), and the group number is the *Parameter Number* (PNU). For example, to read parameter 84.11 from the drive:

84.11 = 54h.0Bh => Parameter Number = 54h, Subindex = 0Bh.



1) 2nd byte reserved

Error response



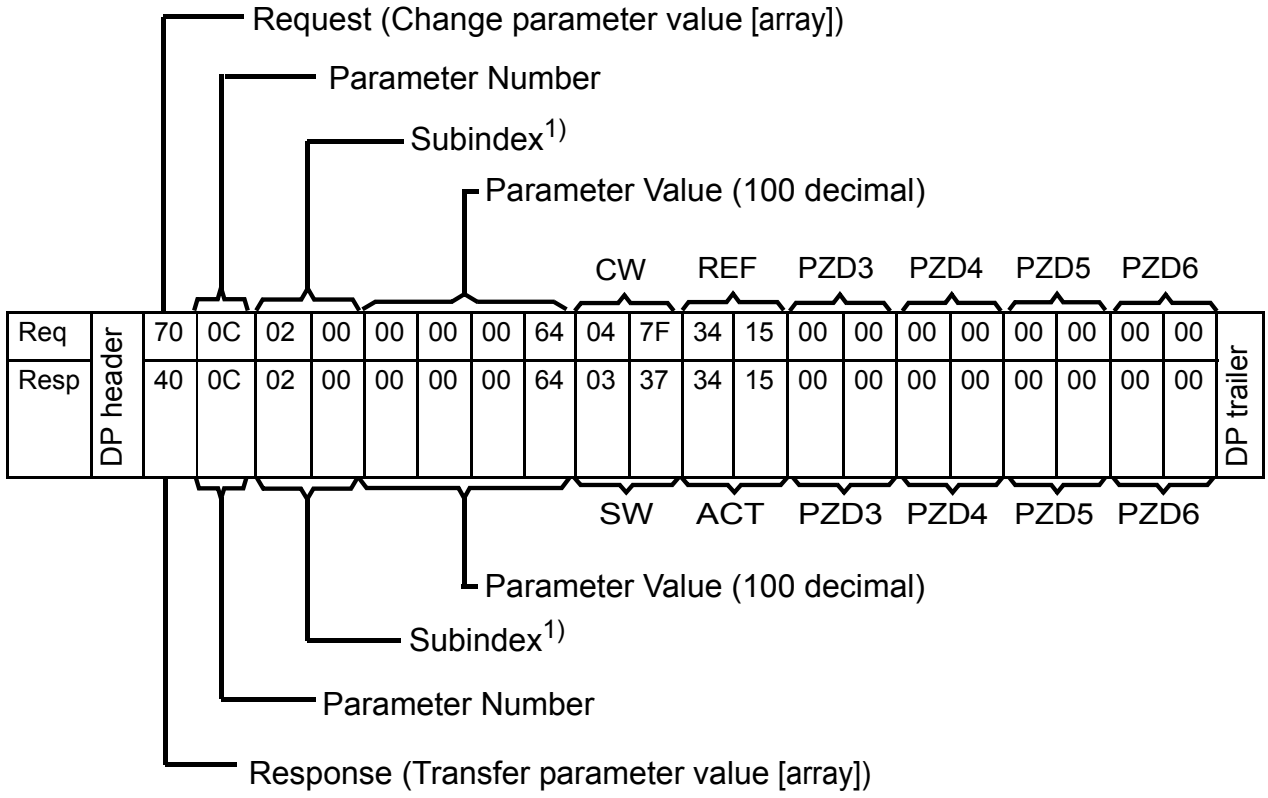
1) 2nd byte reserved

Example 2: Writing a drive parameter (or data set)

To determine the parameter number and subindex for drive parameter writing, convert the drive parameter group number and the parameter index number to hexadecimal. The index number is the *Subindex* (IND), and the group number is the *Parameter Number* (PNU). For example, to write parameter 12.02 to the drive:

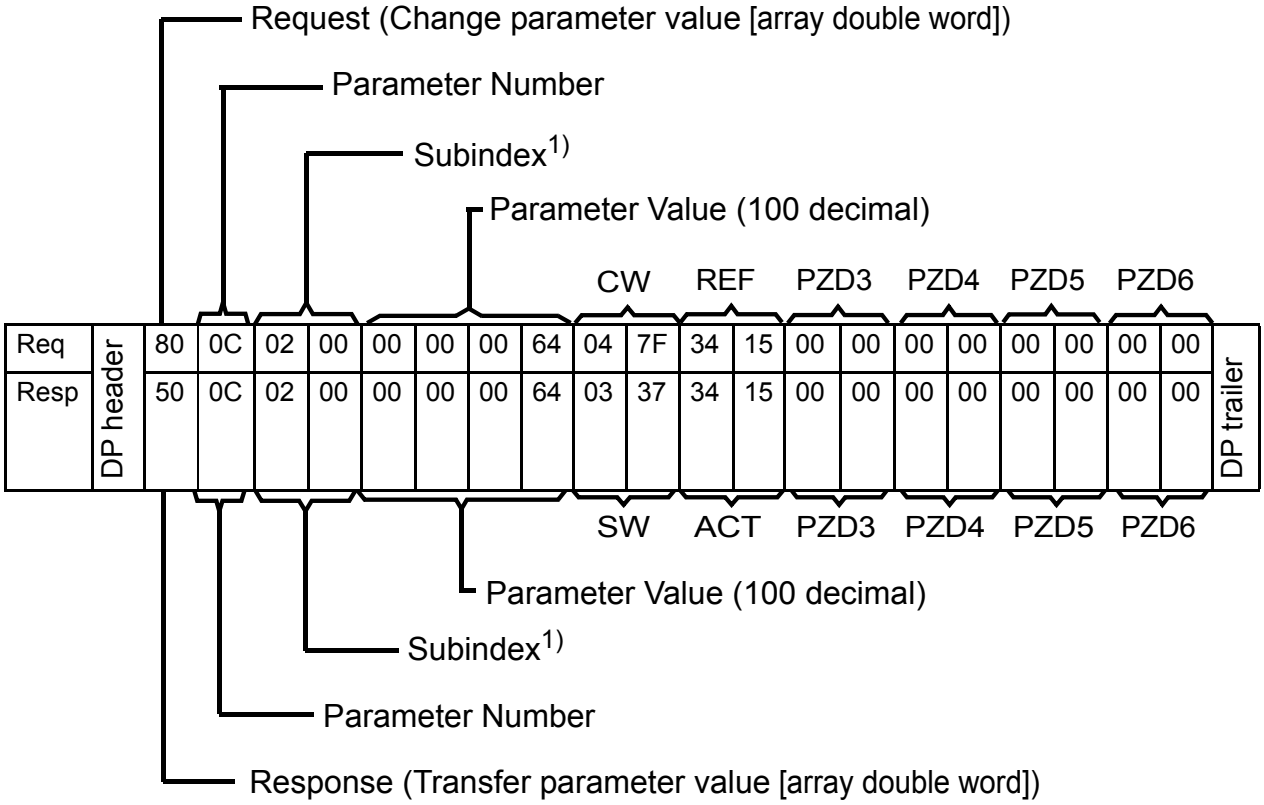
12.02 = 0Ch.02h => Parameter number = 0Ch, Subindex = 02h.

The following is an example of writing a 16-bit parameter.



1) 2nd byte reserved

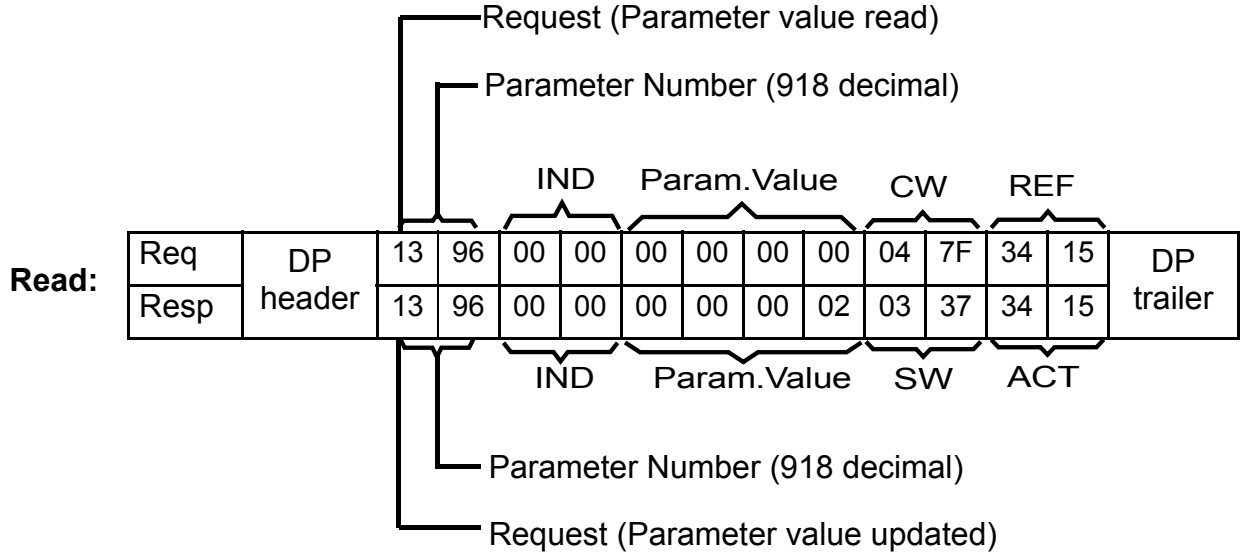
The following is an example of writing a 32-bit parameter:



1) 2nd byte reserved

Example 3: Reading a PROFIdrive parameter (word)

In this example, PROFIdrive parameter 918 is used to read the station number of the slave.

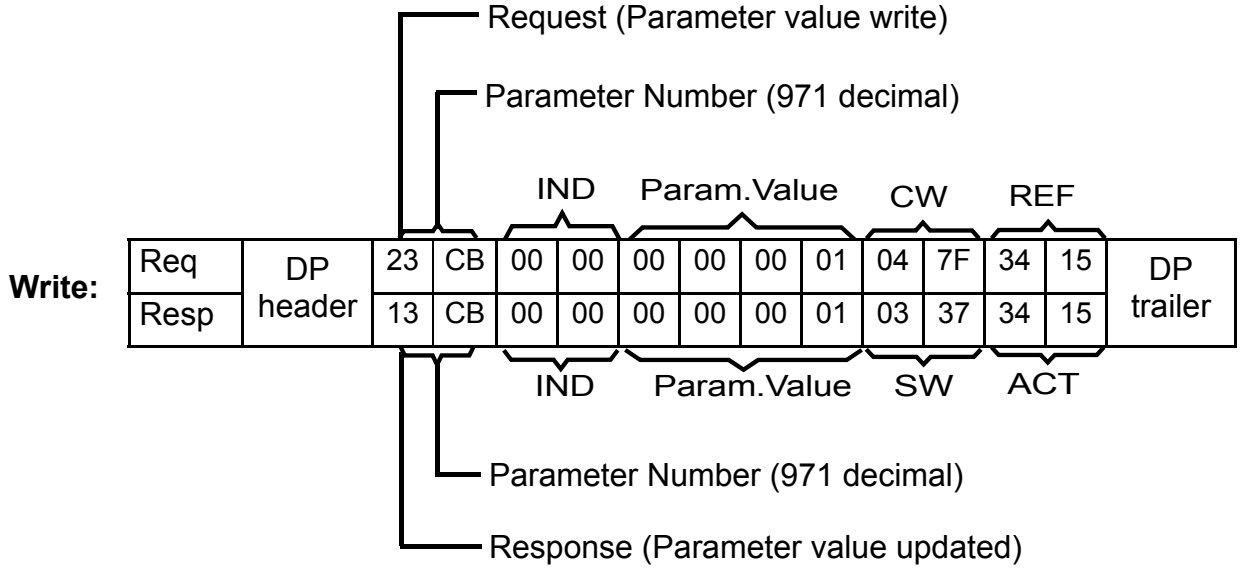


The slave returns its station number (2).

Example 4: Writing a PROFIdrive parameter (word)

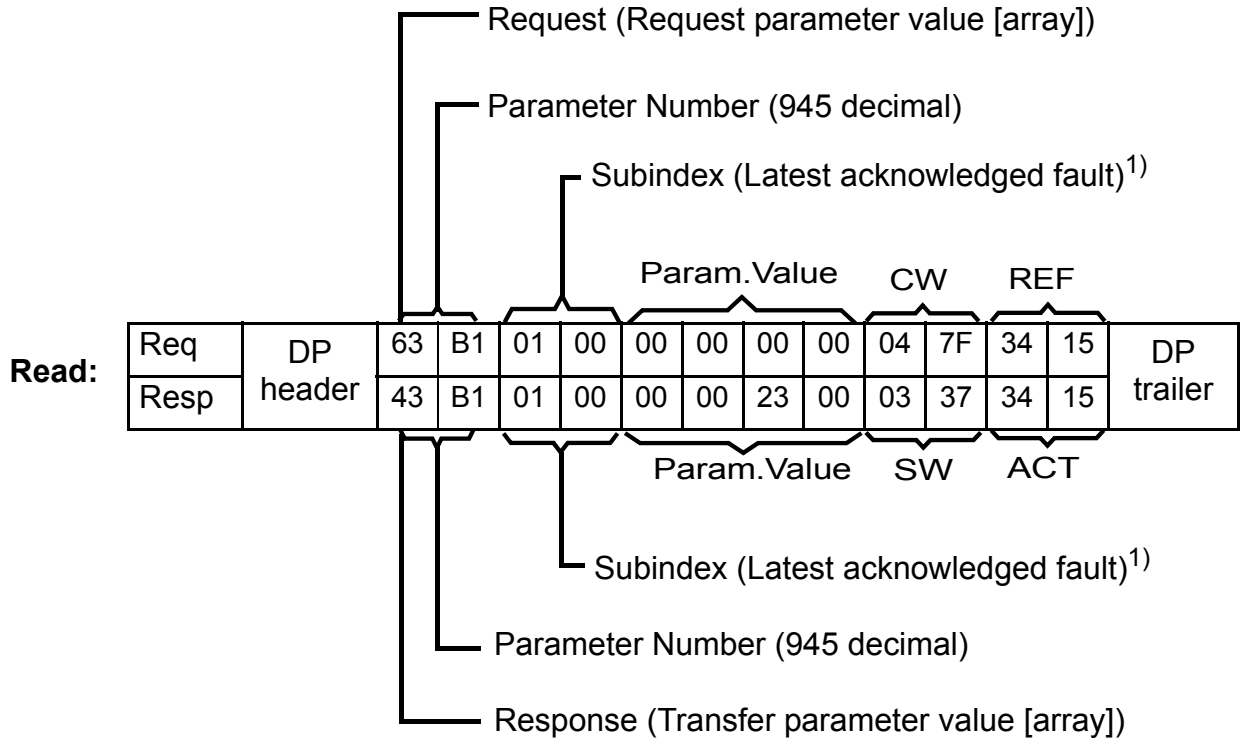
In this example, current parameter settings are saved to the FLASH memory of the drive. This is done by setting the value of PROFIdrive parameter 971 (3CBh) to 1.

Note that the drive always observes the Control word (CW) and reference (REF) bytes. The values shown below are examples.



Example 5: Reading a PROFIdrive parameter (array)

In this example, PROFIdrive parameter 945 is used to read the code of the active fault. As shown on page *164*, parameter 945 is of the array type with subindexes 0 and 1.



1) 2nd byte reserved

The slave returns the code of the active fault (2300h). The fault codes are according to the DRIVECOM® standard. See the drive *User's manual* for drive-specific fault codes.

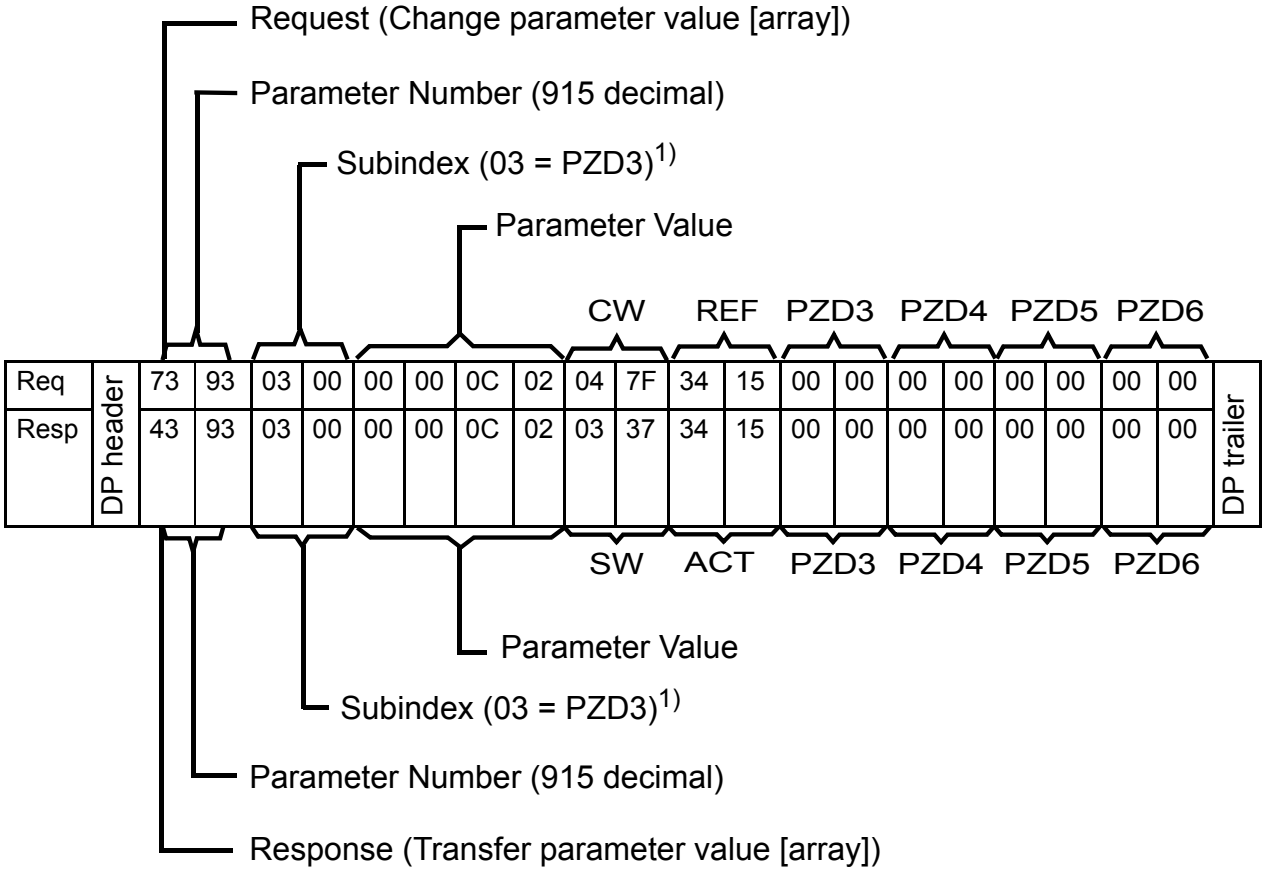
The implementation of the PROFIdrive profile in the adapter module supports the storage of the active and the five latest occurred different faults in the fault buffer. The fault codes can be accessed by PROFIdrive parameters 945 and 947 (see page *164*). The value zero indicates no fault. The subindexes of these parameters are related to each other, that is, parameter 945 with subindex 1 relates to the subindex of parameter 947.

Example 6: Configuring the process data written to the drive

PROFIdrive parameter 915 can be used to define which data is written cyclically to a drive parameter as application-specific process data.

In the example below, the value of drive parameter 12.02 (0Ch.02h) is selected to be taken from PZD3. The parameter will continue to be updated with the contents of PZD3 in each Request frame until a different selection is made.

Subindex (IND) defines which process data word (PZD) the required data is taken from. *Parameter Value* selects the drive parameter to which that word is mapped.



1) 2nd byte reserved

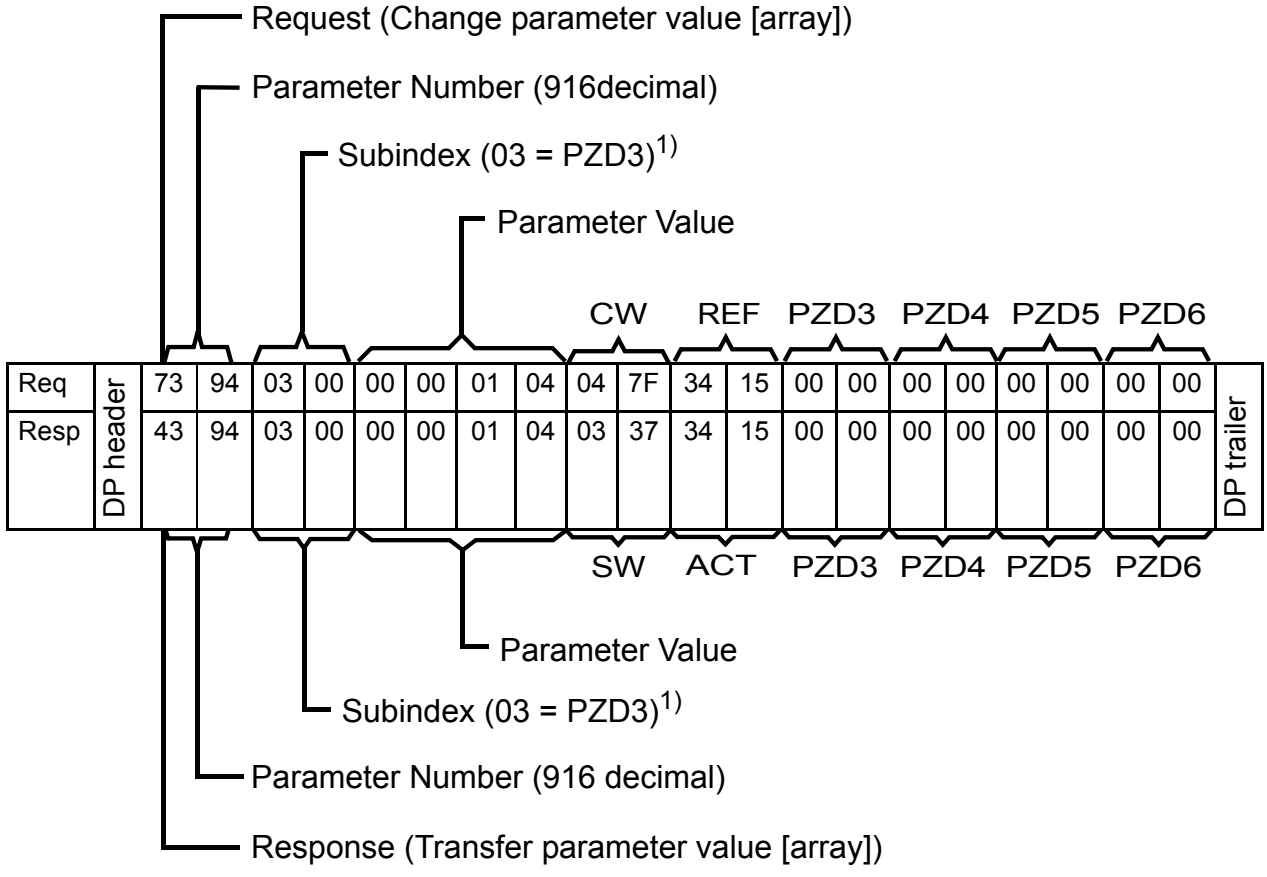
Subsequently, the contents of PZD3 in each Request frame are written to drive parameter 12.02 CONSTANT SPEED 1 until a different selection is made.

Example 7: Configuring the process data read from the drive

PROFIdrive parameter 916 can be used to define which data is read cyclically from the drive as application-specific process data.

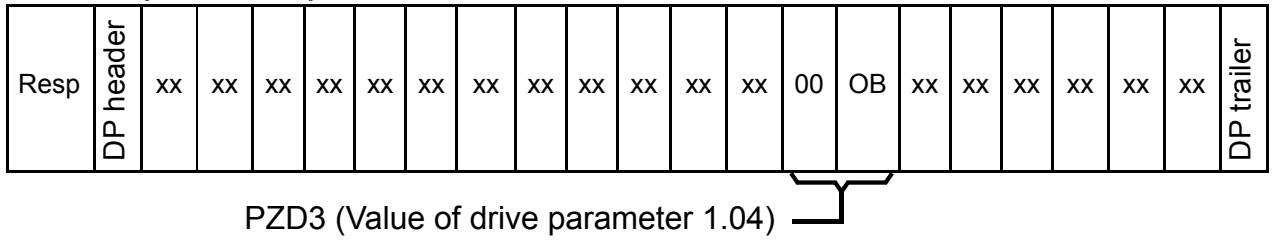
In the example below, drive parameter 1.04 (01h.04h) is selected to be transmitted by the drive as PZD3. The selection is in force until it is superseded by another selection.

Subindex (IND) defines which process data word the required data is transmitted in, and *Parameter Value* defines which drive parameter is mapped to that word.


Request (Change parameter value [array])
Parameter Number (916decimal)
Subindex (03 = PZD3)1)
Parameter Value
CW REF PZD3 PZD4 PZD5 PZD6
Req DP header 73 94 03 00 00 00 01 04 04 7F 34 15 00 00 00 00 00 00 00 00 DP trailer
Resp DP header 43 94 03 00 00 00 01 04 03 37 34 15 00 00 00 00 00 00 00 00 DP trailer
SW ACT PZD3 PZD4 PZD5 PZD6
Parameter Value
Subindex (03 = PZD3)1)
Parameter Number (916 decimal)
Response (Transfer parameter value [array])

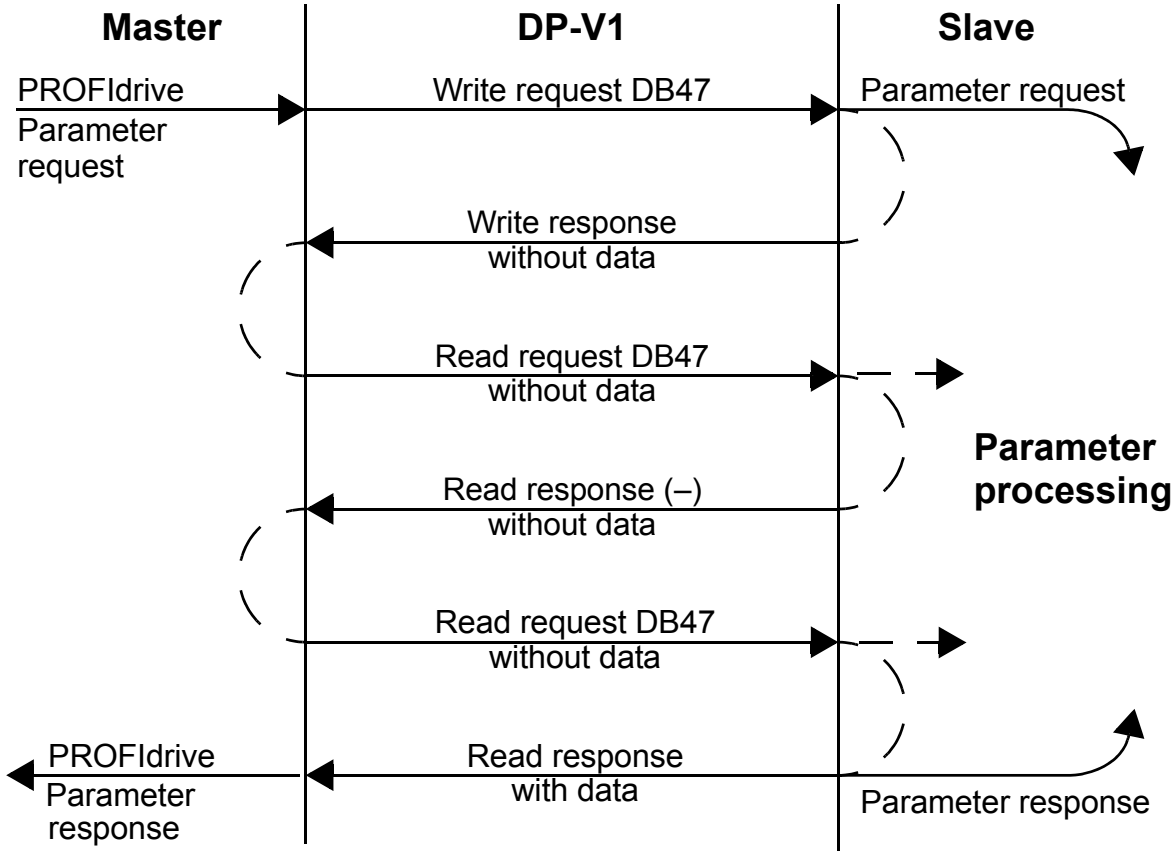
1) 2nd byte reserved

Subsequent response frames:



DP-V1 read/write request sequence

A read/write service on a drive parameter is illustrated below.



The messaging employs DP-V1 data units. The PROFIdrive parameter request is included within the DP-V1 request as data. Likewise, the DP-V1 response contains the PROFIdrive parameter response as data.

A write request (Function number 5Fh – see page *132*) is first sent containing the parameter request.

If the write request is valid, the adapter module acknowledges it with DP-V1 write response code 5Fh with no data. The master will then send a read request. If the adapter module is still busy performing the internal parameter request, it will return a negative response with the DP-V1 error code B5h (State conflict). In this case, the read request will be repeated by the master until the adapter module has the PROFIdrive response data ready.

If the write request is invalid, a negative response is returned with a DP-V1 error code (see page *133*).

PROFIBUS SD2 telegram for SAP 51

The read/write service uses a variable-length PROFIBUS SD2 telegram shown below.

DP header										DP trailer	
SD	**LE**	**LEr**	**SD**	**DA**	**SA**	**FC**	**DSAP**	**SSAP**	**DU**	**FCS**	**ED**
68h	x	x	68h	xx	xx	x	xx	xx	x…	xx	16h

SD = Start delimiter
LE = Length
LEr = Length repeated
DA = Destination address
SA = Source address
FC = Function code
DSAP = Destination service access point
SSAP = Source service access point
DU = Data unit for DP services
FCS = Frame checking sequence
ED = End delimiter

Data unit					
DP-V1 Command/Response				PROFIdrive V3 Parameter Channel	
DU0	DU1	DU2	DU3	Request/Response header (See the tables on pages *134* and *136*.)	Data

Byte	Meaning	Value
DU0	Function number	See page *132*.
DU1	Slot number	0 = Module itself 1 = Drive parameter access
DU2	Index	47 (0x2F)
DU3	Data length	(Depends on type of message)
DU4…DUn	PROFIdrive data	

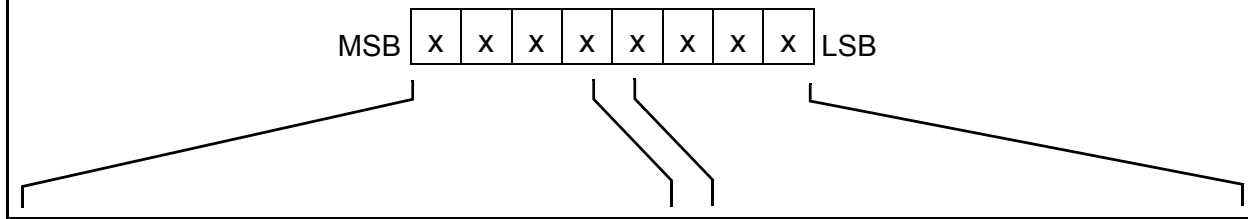
The table below lists the DP-V1 function numbers.

Value	Meaning
0x48	Idle REQ, RES
0x51	Data transport REQ, RES
0x56	Resource manager REQ
0x57	Initiate REQ, RES
0x58	Abort REQ
0x5C	Alarm REQ, RES
0x5E	Read REQ, RES
0x5F	Write REQ, RES
0xD1	Data transport negative response
0xD7	Initiate negative response
0xDC	Alarm negative response
0xDE	Read negative response
0xDF	Write negative response

The table below lists the DP-V1 error responses.

Byte	Meaning and value
DU0	Function number = 0xDF (Error Write) = 0xDE (Error Read)
DU1	Error_Decode: PROFIdrive: Always 0x80 (DP-V1 codes)
DU2	Error_Code_1: Error class/error code (see page 133)
DU3	Error_Code_2: Always 0

The table below lists the error codes for the DP-V1 error responses.



Error class	Meaning	Error code
0…9	(Reserved)	
10 (0x0A)	Application	0 = Read error 1 = Write error 2 = Module failure 3…7 = Reserved 8 = Version conflict 9 = Feature not supported 10…15 = User-specific
11 (0x0B)	Access	0 = Invalid index 1 = Write length error 2 = Invalid slot 3 = Type conflict 4 = Invalid area 5 = State conflict 6 = Access denied 7 = Invalid range 8 = Invalid parameter 9 = Invalid type 10…15 = User-specific
12 (0x0C)	Resource	0 = Read constraint conflict 1 = Write constraint conflict 2 = Resource busy 3 = Resource unavailable 4…7 = Reserved 8…15 = User-specific
13…15	User-specific	

The table below shows the contents of the PROFIdrive Request header.

Field(s)	Description	Range	Byte/Word
Request Reference	Unique identification set by the master. Changed for each new request.	1…255	Byte
Request ID	Request type for the issued block	Request Parameter (01h) Change Parameter (02h)	Byte
Drive Object ID	To be set to 0 or 1.	0…255	Byte
No. of Parameters	Number of parameters that are present in the request	1…37	Byte
Attribute	Type of object being accessed **Note:** “Description” and “Text” are not supported.	Value (10h) Description (20h) Text (30h)	Byte
No. of Elements	Number of array elements accessed or length of string accessed. Set to 0 if non-array parameters are used.	0, 1…234	Byte
Parameter Index	Address of the parameter that is being accessed. “0” is allowed by FPBA-01.	1…65535	Word

Field(s)	Description	Range	Byte/Word
Subindex	Addresses • the first array element of the parameter or • the beginning of a string access or • the text array or • the description element that is being accessed.	0…65535	Word
Format[1)]	See the table on page *137*.	See the table on page *137*.	Byte
Number of Values[1)]	Number of values following	0…234	Byte
Values[1)]	The values of the request. In case of an odd number of bytes, a zero byte is appended to ensure the word structure of the telegram.	–	See the Format field.

[1)] Only if Request ID is 02h (Change Parameter). The Format, Number of Values and Values fields are repeated for other parameters.

The table below shows the contents of the PROFIdrive Response header.

Field(s)	Description	Range
Request Reference (mirrored)	Mirrored from the request	1…255
Response ID	Response from the slave. In case any requested services fail, a “not acknowledged” (NAK) response will be indicated.	Request Param OK (01h) Request Param NAK (81h) Change Param OK (02h) Change Param NAK (82h)
Drive Object ID	To be set to 1.	0…255
No. of Parameters	Number of parameters that are present in the response	1…37
Format[1)]	See the table on page *137*.	See the table on page *137*.
Number of Values[1)]	Number of values following	0…234
Values[1)]	The values of the request. In case of an odd number of bytes, a zero byte is appended to ensure the word structure of the telegram.	–

[1)] Only if Response ID is 01h (Request Parameter OK). The Format, Number of Values and Values fields are repeated for other parameters.

The table below shows the data types for the Format field.

Code	**Type**
0x00	(Reserved)
0x01…0x36	Standard data types
	1 Boolean (not supported) 2 Integer8 (not supported) 3 Integer16 4 Integer32 5 Unsigned8 (not supported) 6 Unsigned16 7 Unsigned32 8 Floating point (not supported) 9 Visible string (not supported) • • •
0x37…0x3F	(Reserved)
0x40	Zero
0x41	Byte
0x42	Word
0x43	Double word
0x44	Error
0x45…0xFF	(Reserved)

The table below shows the PROFIdrive parameter request error codes.

Error #	Meaning	Used at
00h	Impermissible parameter number	Access to an unavailable parameter
01h	Parameter value cannot be changed	Change access to a parameter value that cannot be changed
02h	Low or high limit exceeded	Change access with a value outside the limits
03h	Invalid subindex	Access to an unavailable subindex
04h	No array	Access with a subindex to a non-indexed parameter
05h	Incorrect data type	Change access with a value that does not match the data type of the parameter
06h	Setting not permitted (can only be reset)	Change access with a value unequal to 0 when this is not permitted
07h	Description element cannot be changed	Change access to a description element that cannot be changed
09h	No description data available	Access to an unavailable description (Parameter value is available.)
0Bh	No operation priority	Change access rights without rights to change parameters
0Fh	No text array available	Access to a text array that is not available (Parameter value is available.)
11h	Request cannot be executed because of operating mode	Access is temporarily not possible for reasons that are not specified in detail.
14h	Value impermissible	Change access with a value that is within limits but is not permissible for other long-term reasons (parameter with defined single values)

Error #	Meaning	Used at
15h	Response too long	The length of the current response exceeds the maximum transmittable length.
16h	Parameter address impermissible	Illegal value or value that is not supported for the attribute, number of elements, parameter number or sub-index, or a combination
17h	Illegal format	Write request: Illegal format or format of parameter data that is not supported
18h	Number of values inconsistent	Write request: Number of values of parameter data does not match number of elements at the parameter address
65h…FF	Manufacturer-specific error area	–
65h	Vendor-specific error	Vendor-specific error
66h	Request not supported	Request not supported
67h	Communication error	Request cannot be completed because of a communication error.
6Eh	Non-volatile error	Failure during write to non-volatile memory
6Fh	Time-out error	Request aborted because of timeout
78h	PZD map failure	Parameter cannot be mapped to PZD (size mismatch or non-existent).
79h	PZD memory failure	Parameter cannot be mapped to PZD (out of memory).
7Ah	Multiple PZD map	Parameter cannot be mapped to PZD (multiple PZD write).
82h	Control word bit map	Cannot map Control word bit (parameter 933…937, eg, double mapping of bits).
8Ch	Set torque mode error	Cannot change mode to TORQUE (frequency is used).

Error #	Meaning	Used at
90h	Illegal Request ID	The request ID of the response is illegal.
96h	Internal buffer	Buffer overflow
A0h	Internal communication	Communication error between the module and the drive

Parameter data transfer examples (DP-V1)

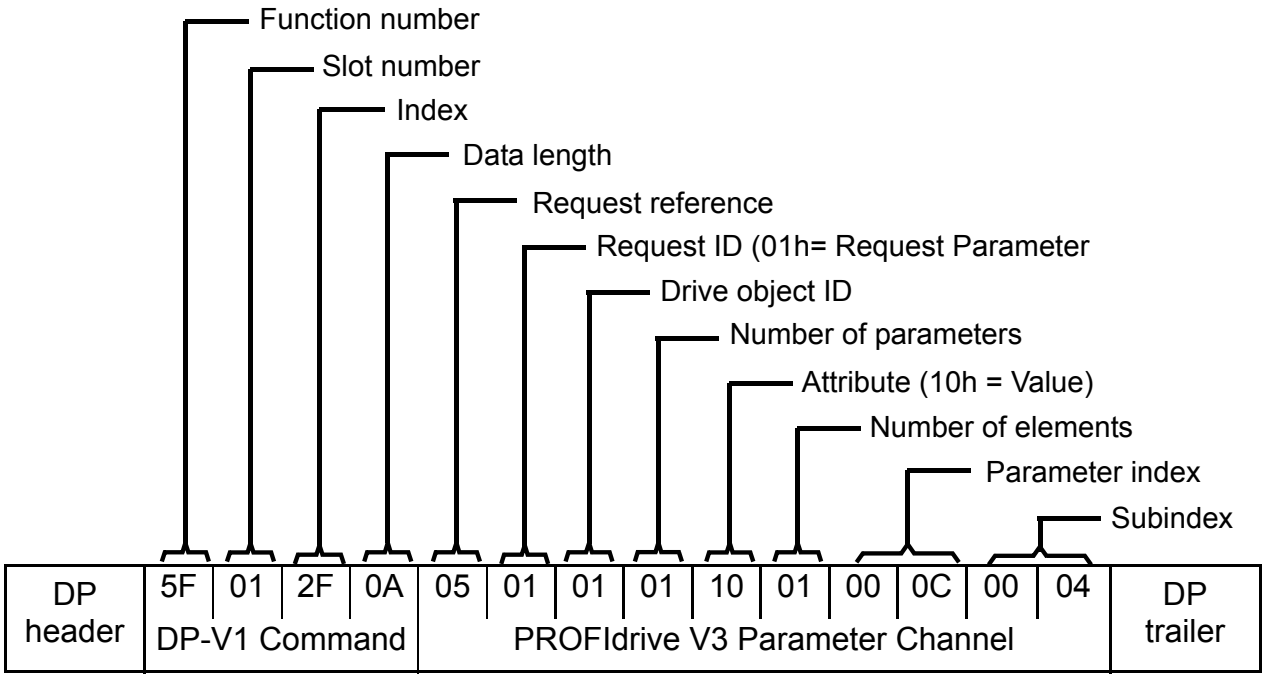
The following examples show how parameter data is transferred using the DP-V1 mechanisms READ and WRITE.

Note: Only the “data unit” part of the SD2 telegram is presented in the examples. See *PROFIBUS SD2 telegram for SAP 51* on page *131*.

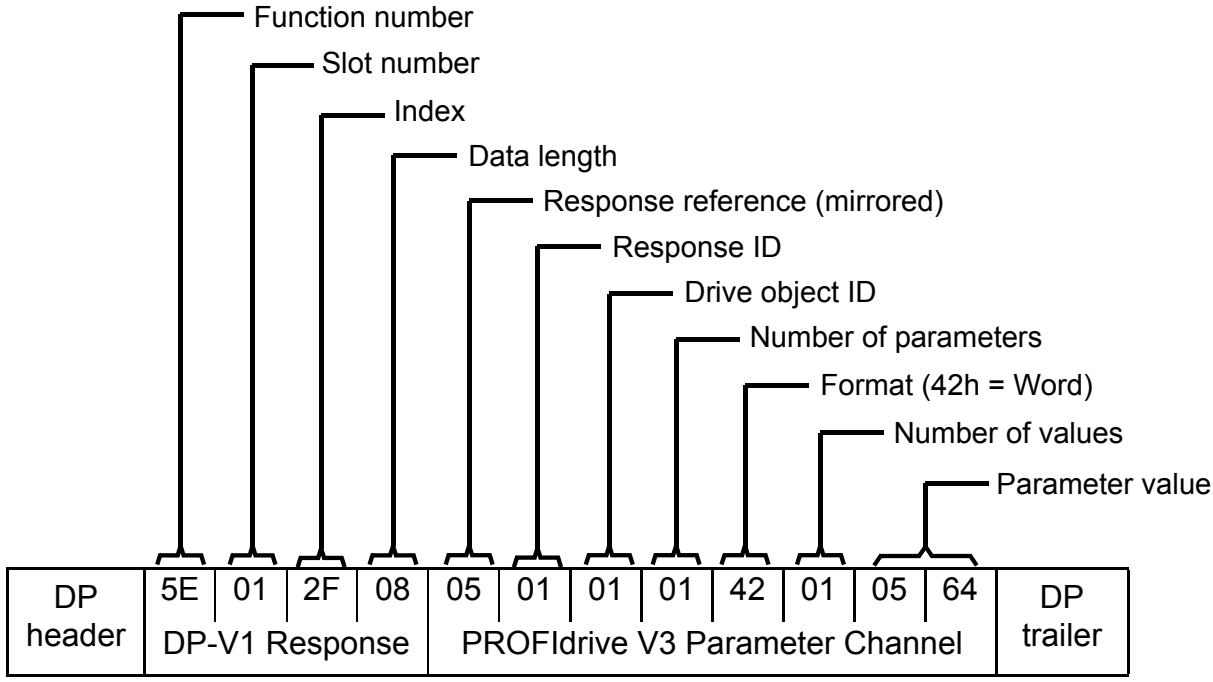
Example 1a: Reading a drive parameter (array element)

Drive parameters are addressed so that the drive parameter group corresponds to the *Parameter index* (PNU), and the drive parameter number within the group corresponds to the *Subindex* (IND). In the following example, a value is read from drive parameter number 12.04 (0C.04h).

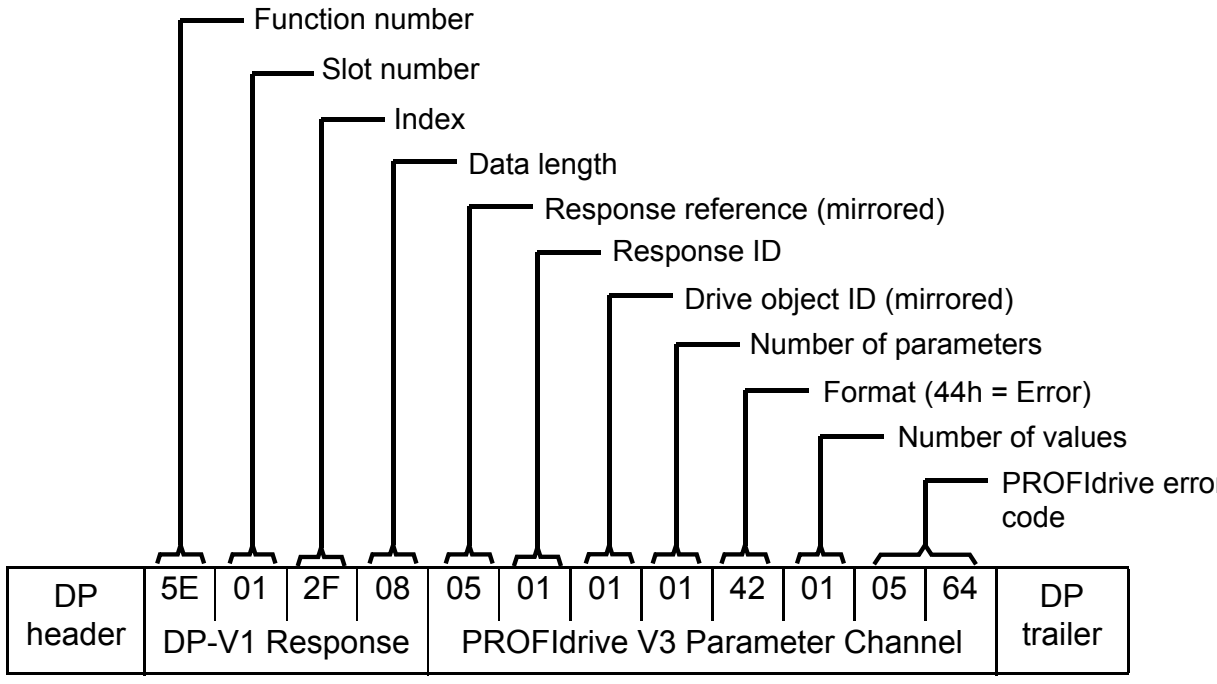
- DP-V1 Write request (Read parameter value):



- Positive Read response to DP-V1 Read request:



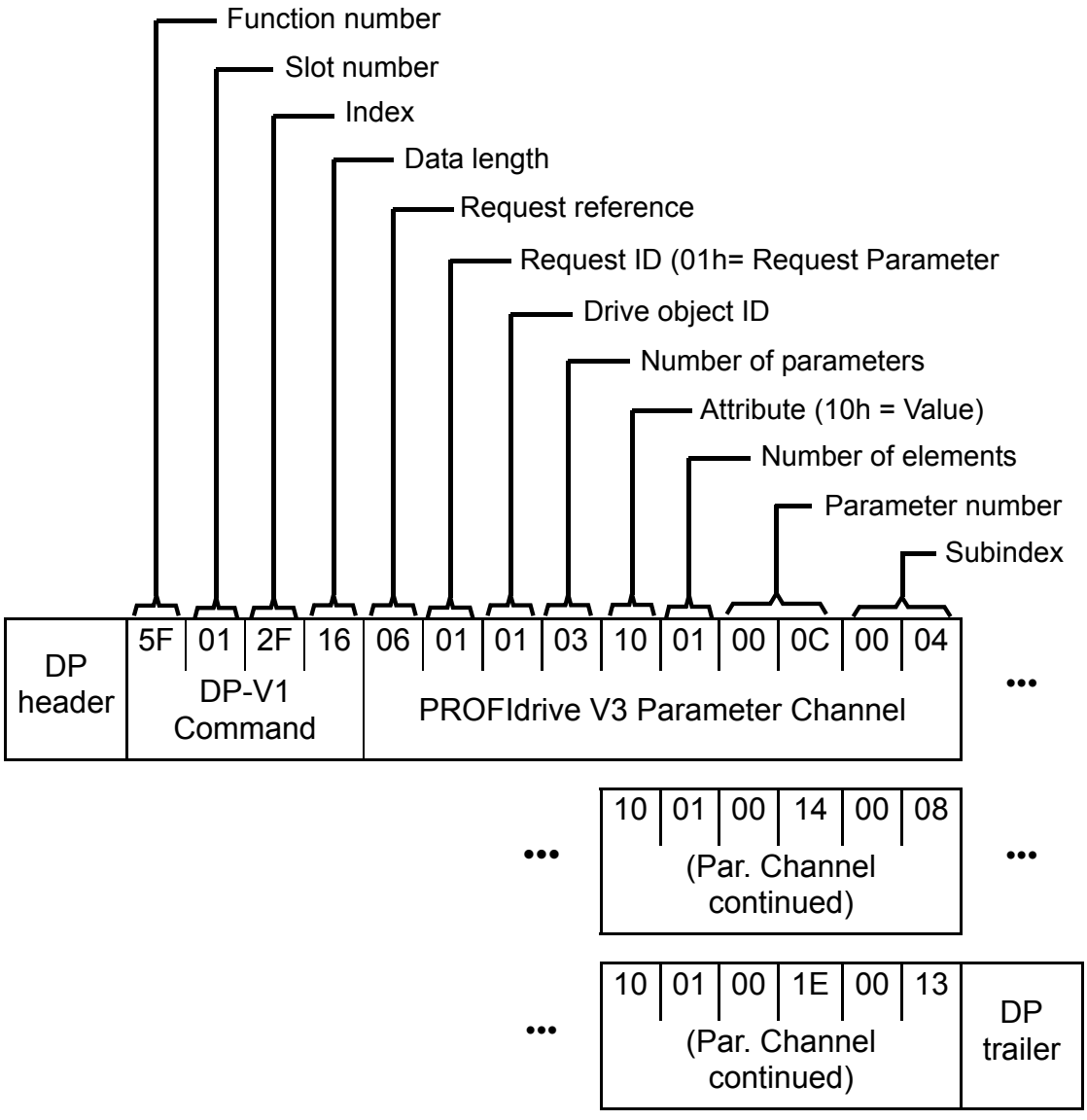
- Negative response to PROFIdrive Read request:



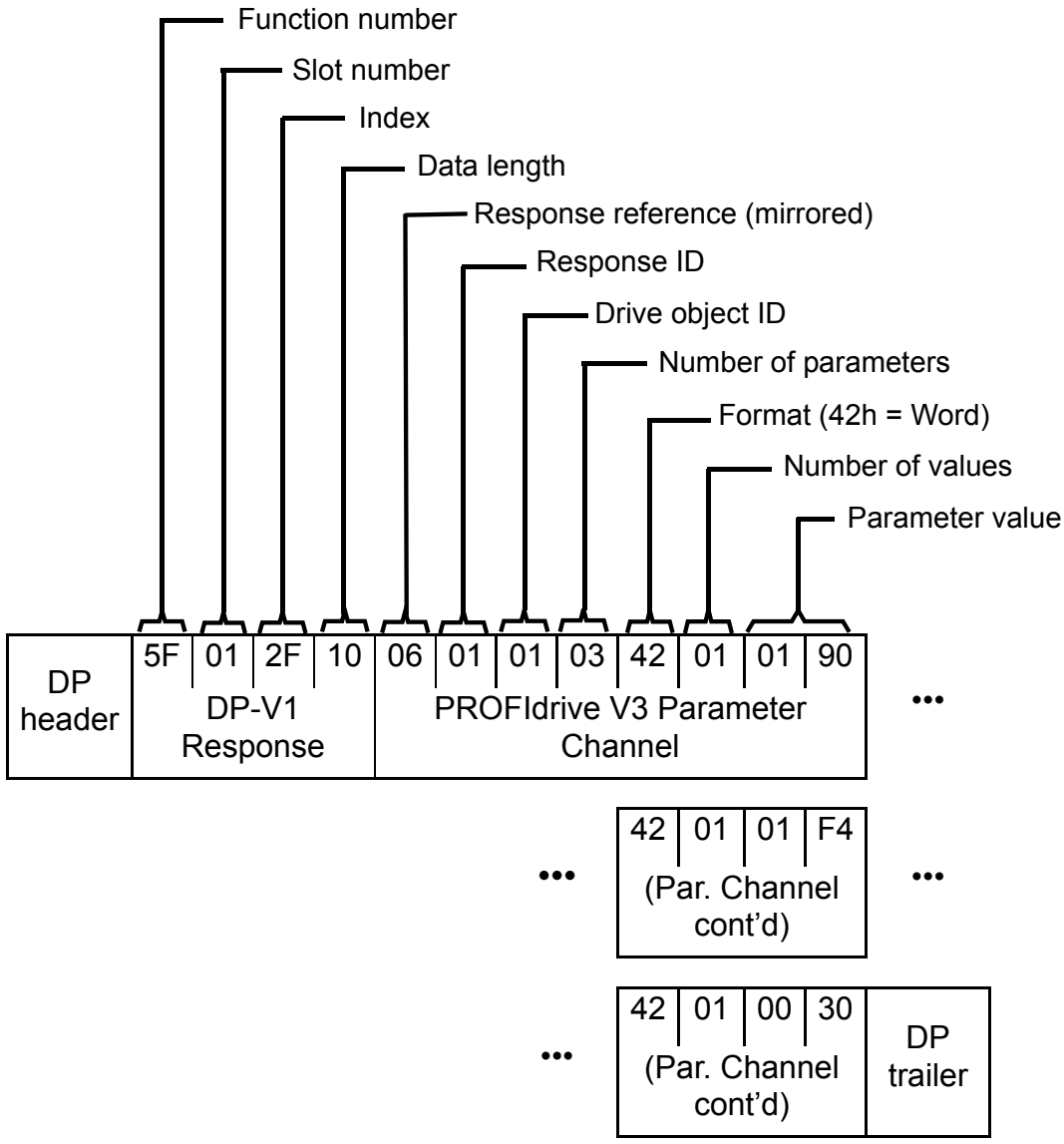
Example 1b: Reading 3 drive parameters (multi-parameter)

In this example, three parameters (12.04, 20.08 and 30.19) are read using one telegram.

- DP-V1 Write request (Read parameter value):



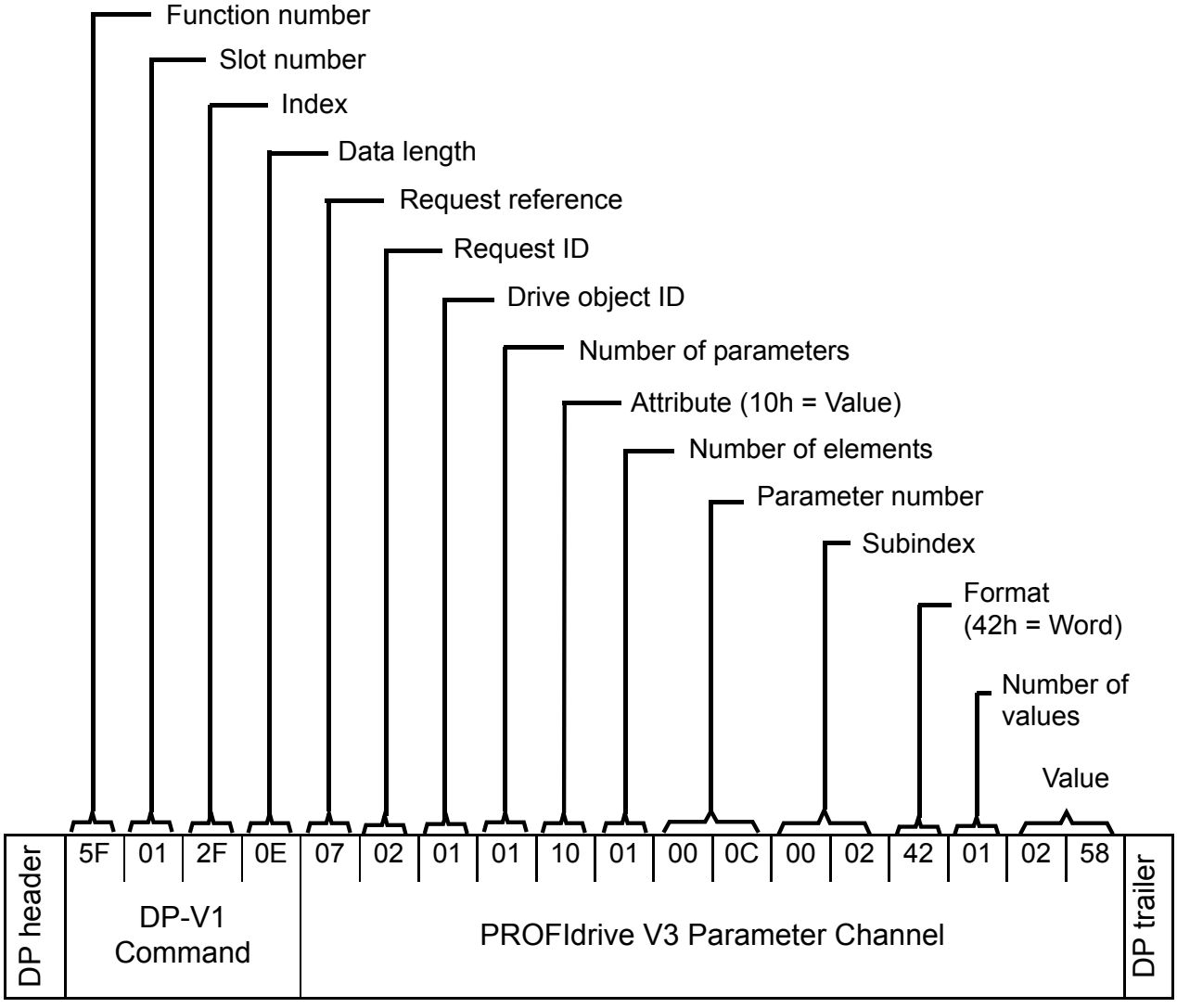
- Positive Read response to DP-V1 Read request:

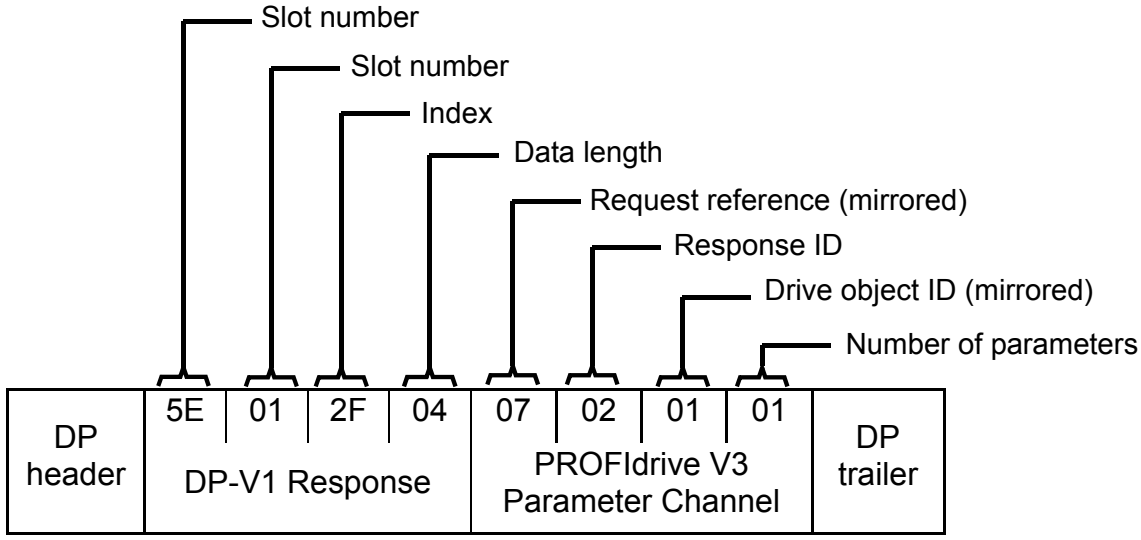


The values 190h (400), 1F4h (500) and 1Eh (30) are returned.

Example 2a: Writing a drive parameter (one array element)

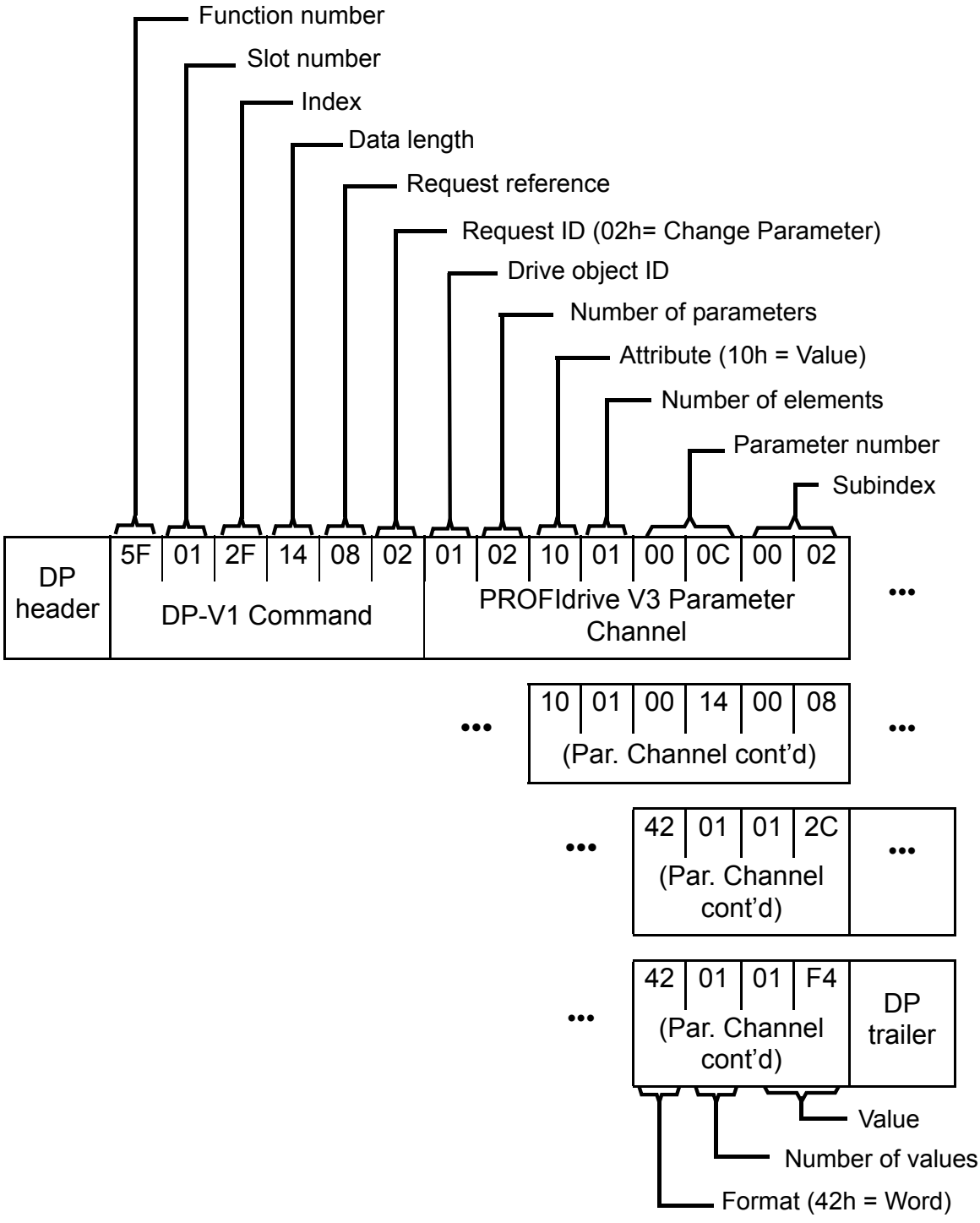
Drive parameters are addressed so that the drive parameter group corresponds to the *Parameter index* (PNU), and the drive parameter number within that group corresponds to the *Subindex* (IND). In the following example, a value is written to drive parameter 12.02 (0C.02h).

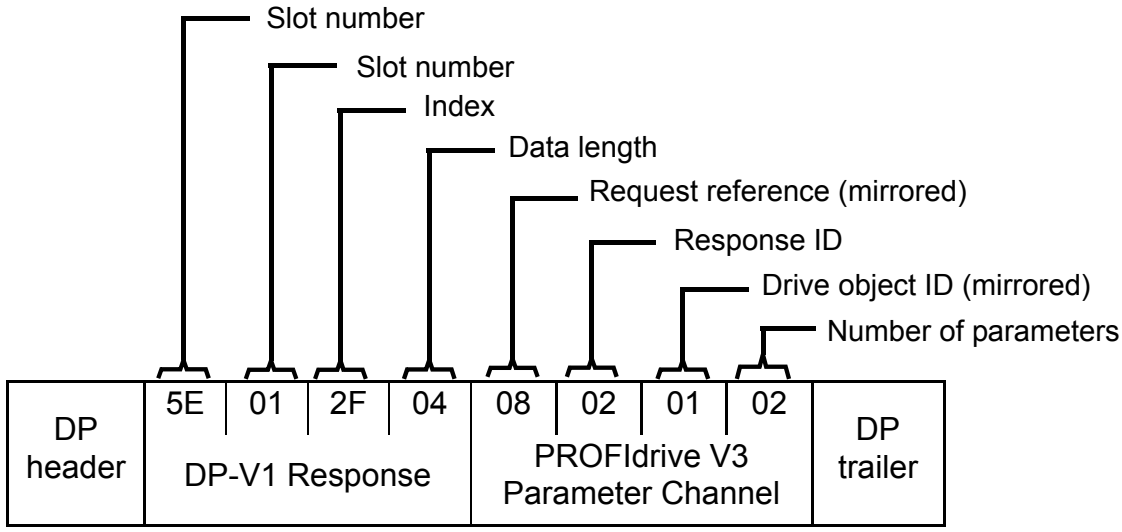



Slot number
Slot number
Index
Data length
Request reference (mirrored)
Response ID
Drive object ID (mirrored)
Number of parameters
DP header
5E
01
2F
04
07
02
01
01
DP-V1 Response
PROFIdrive V3 Parameter Channel
DP trailer

Example 2b: Writing 2 drive parameters (multi-parameter)

In this example, the values 300 (12Ch) and 500 (1F4h) are written to drive parameters 12.02 (0C.02h) and 20.08 (14.08h) respectively using one telegram.

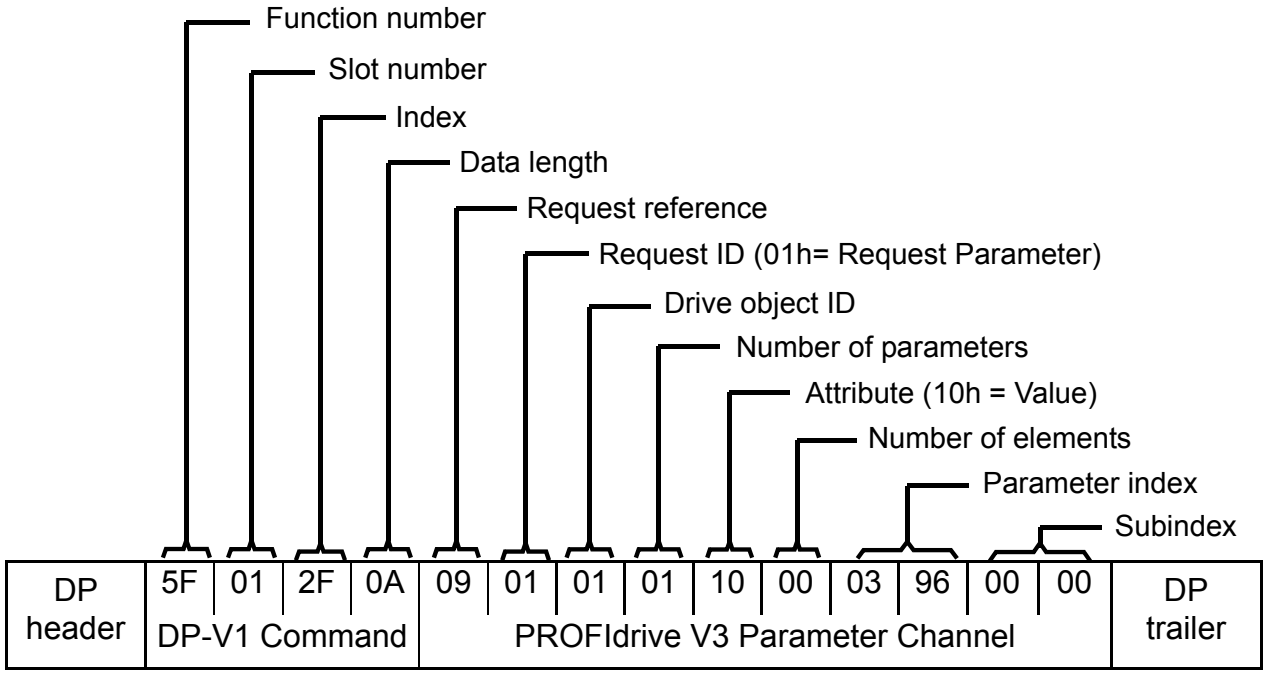



Slot number
Slot number
Index
Data length
Request reference (mirrored)
Response ID
Drive object ID (mirrored)
Number of parameters
DP header
5E
01
2F
04
08
02
01
02
DP-V1 Response
PROFIdrive V3 Parameter Channel
DP trailer

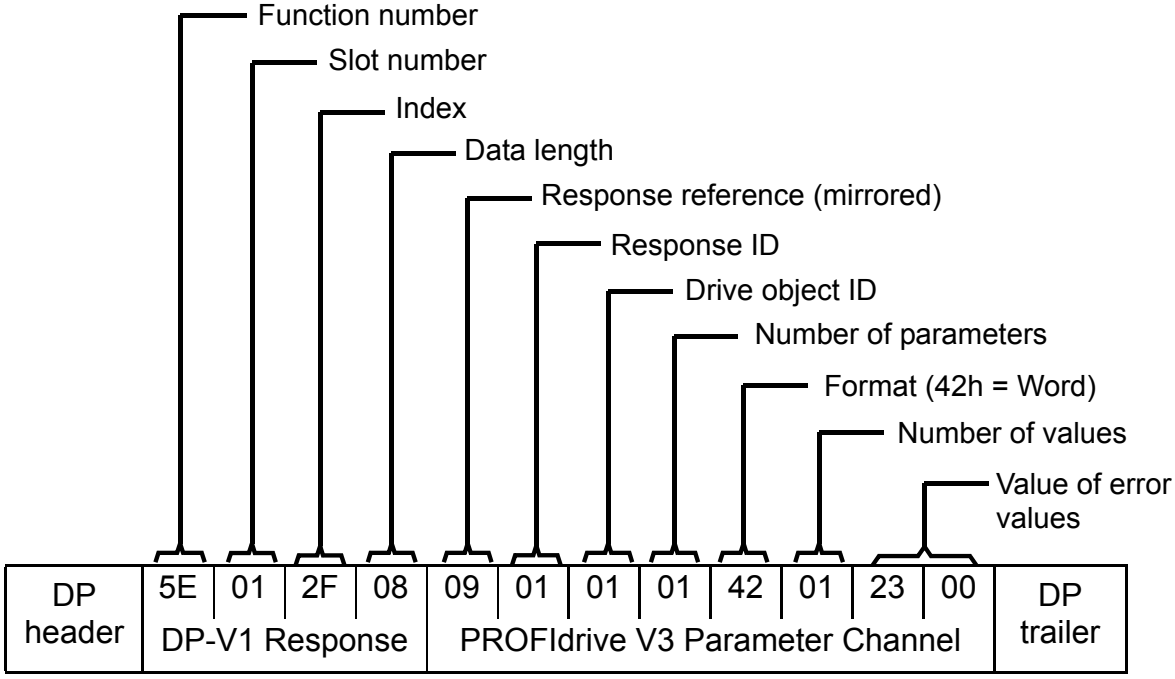
Example 3: Reading a PROFIdrive parameter

In this example, PROFIdrive parameter 918 (396h) is used to read the station number of the slave.

- DP-V1 Write request (Reading a PROFIdrive parameter):



- DP-V1 Read response:



The slave returns the station number of the slave (0003h in this example).

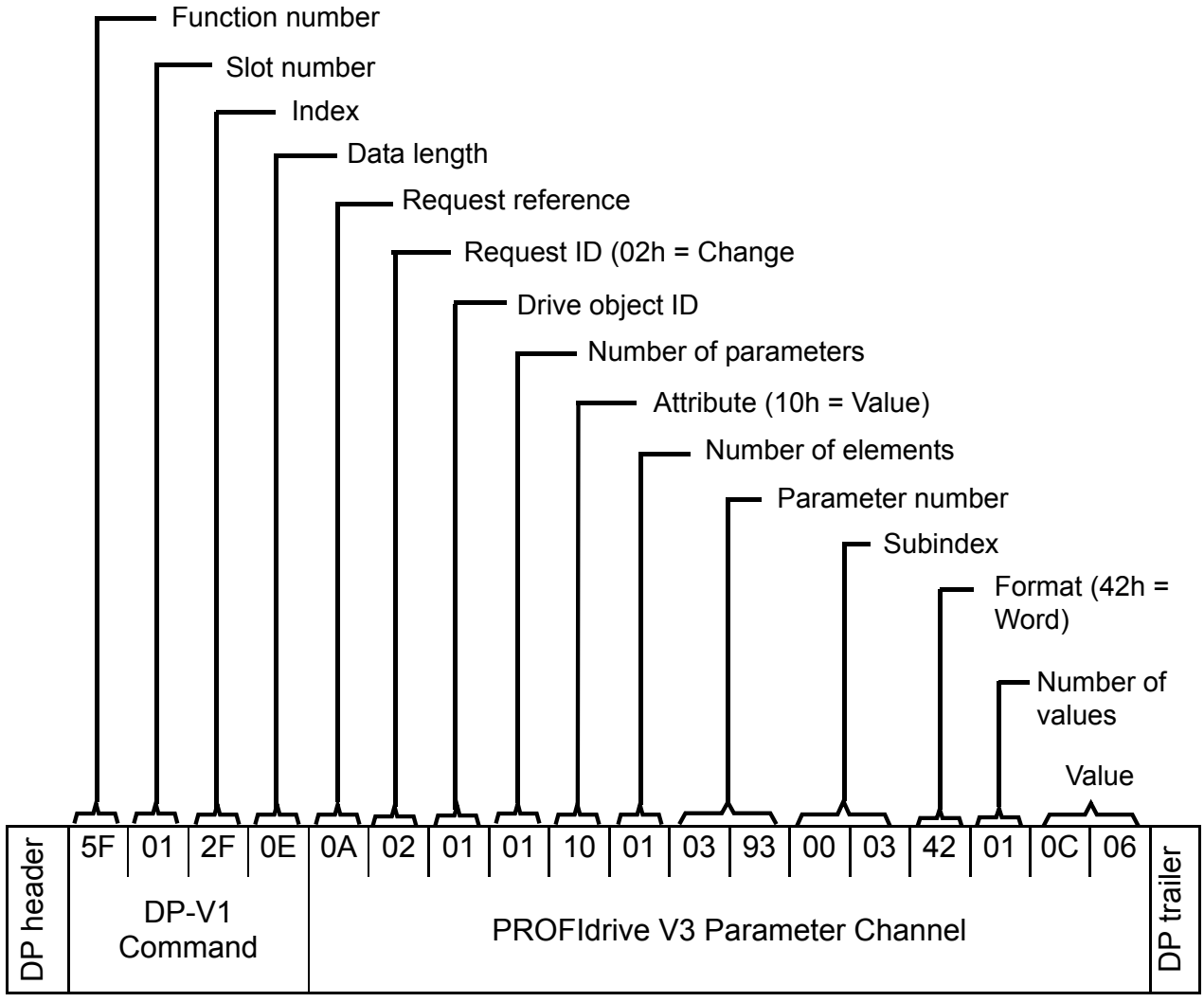
Example 4: Configuring the process data written to the drive

PROFIdrive parameter 915 (393h) can be used to define which data is written cyclically to a drive parameter as application-specific process data.

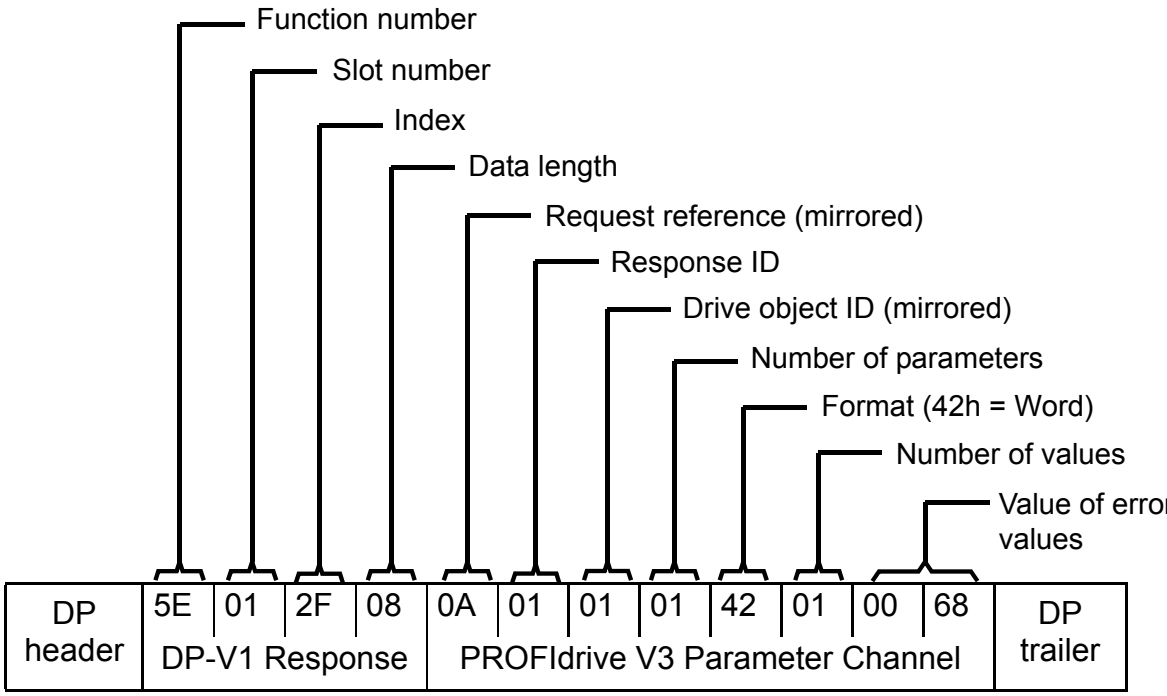
In the example below, the value of drive parameter 12.06 (0C.06h) is selected to be taken from PZD3. The parameter will continue to be updated with the contents of PZD3 in each Request frame until a different selection is made.

Subindex (IND) defines which process data word the required data is taken from. *Value* selects the drive parameter to which that word is mapped.

- DP-V1 Write request:



- DP-V1 Read response:

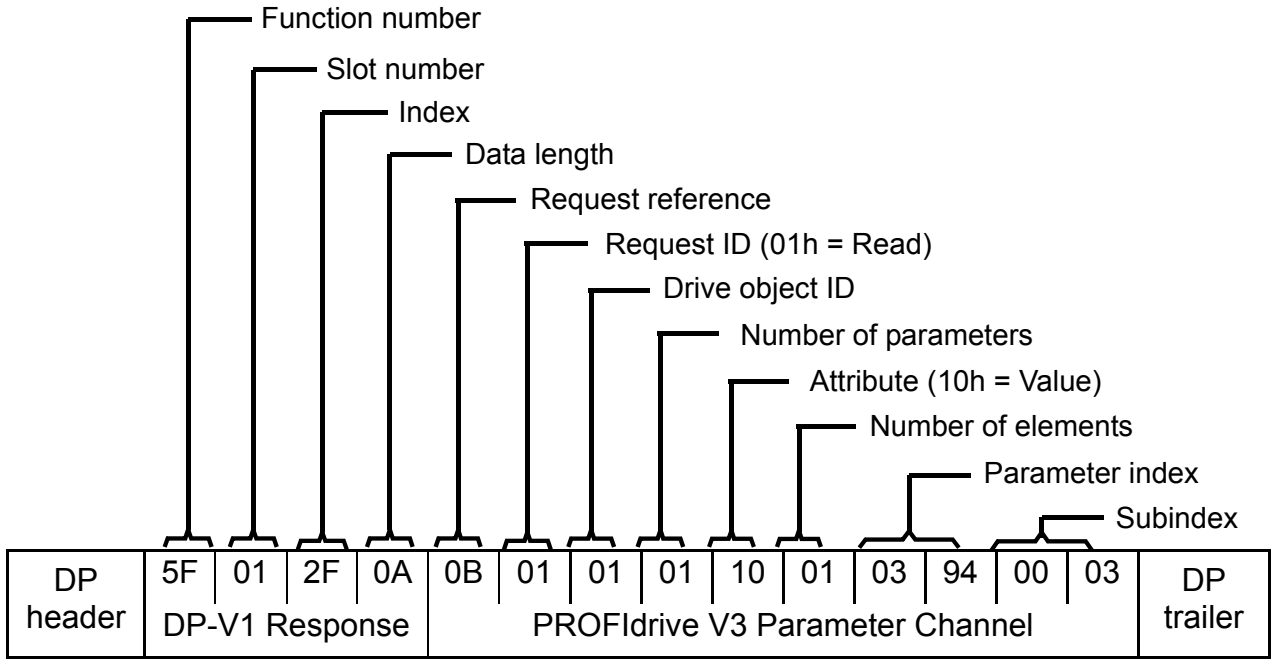


Subsequently, the contents of PZD3 in each Request frame are written to drive parameter 12.06 until a different selection is made.

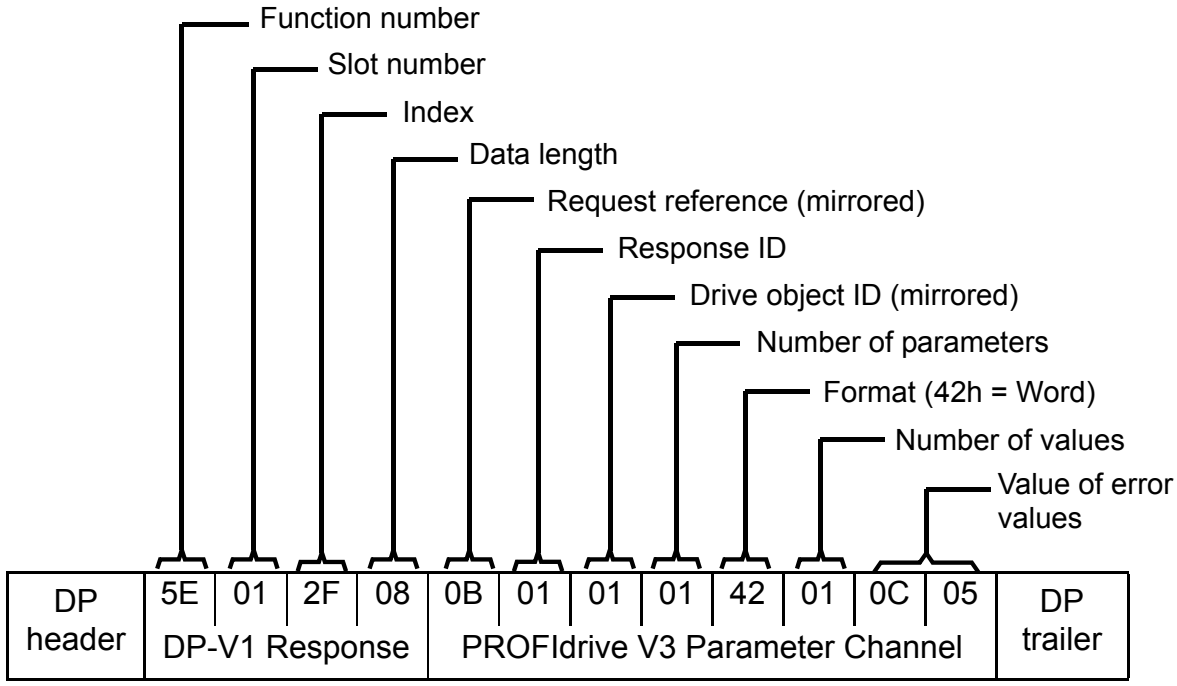
Example 5: Determining the source of process data read from the drive

PROFIdrive parameter 916 (394h) can be used to define which data is read cyclically from the drive as application-specific process data. In the example below, the parameter is used to determine which drive parameter the contents of PZD3 are taken from. *Subindex* (IND) defines which process data word the required data is transmitted in.

- DP-V1 Write request:



- DP-V1 Read response:



Value indicates the source of PZD3 as drive parameter 12.05 (0C.05h).

9

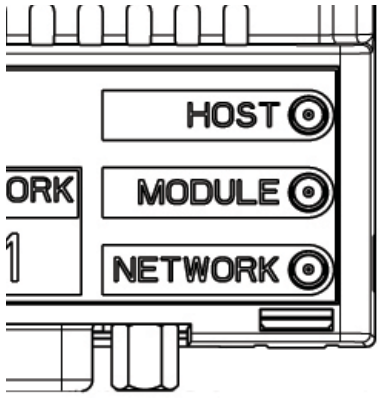
Diagnostics

What this chapter contains

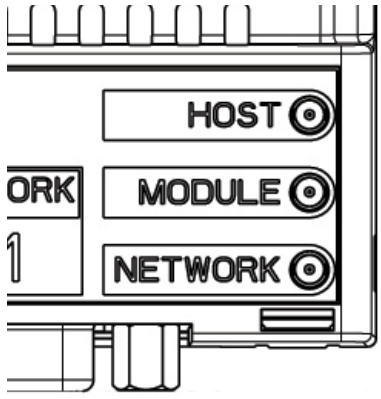
This chapter explains how to trace faults with the status LEDs on the adapter module.

LED indications

The adapter module is equipped with three bicolor diagnostic LEDs. The LEDs are described below.



Name	Color	Function
HOST	Green	Connection to host OK
	Blinking red	Establishing communication to host, or communication to host lost
	Flashing orange, alternating with the MODULE flashing orange	Internal file system error. The error may be cleared by cycling drive power. If the error persists, contact your local ABB representative.



Name	Color	Function
MODULE	Green	Module status OK
	Blinking red	Configuration mismatch
	Blinking red in unison with HOST (blinking red)	Establishing communication to host
	Blinking green in unison with NETWORK (blinking red)	Network connection lost
	Blinking green once per second with NETWORK steady green	No communication with this node
	Blinking green 3 times per second with NETWORK steady green	Only Class 2 master connection (no cyclic communication established)
	Red	Module fault
	Flashing orange, alternating with the HOST flashing orange	Internal file system error. The error may be cleared by cycling drive power. If the error persists, contact your local ABB representative.
NETWORK	Blinking green	Establishing network connection
	Green	Network connection OK
	Blinking red	Network connection lost

10

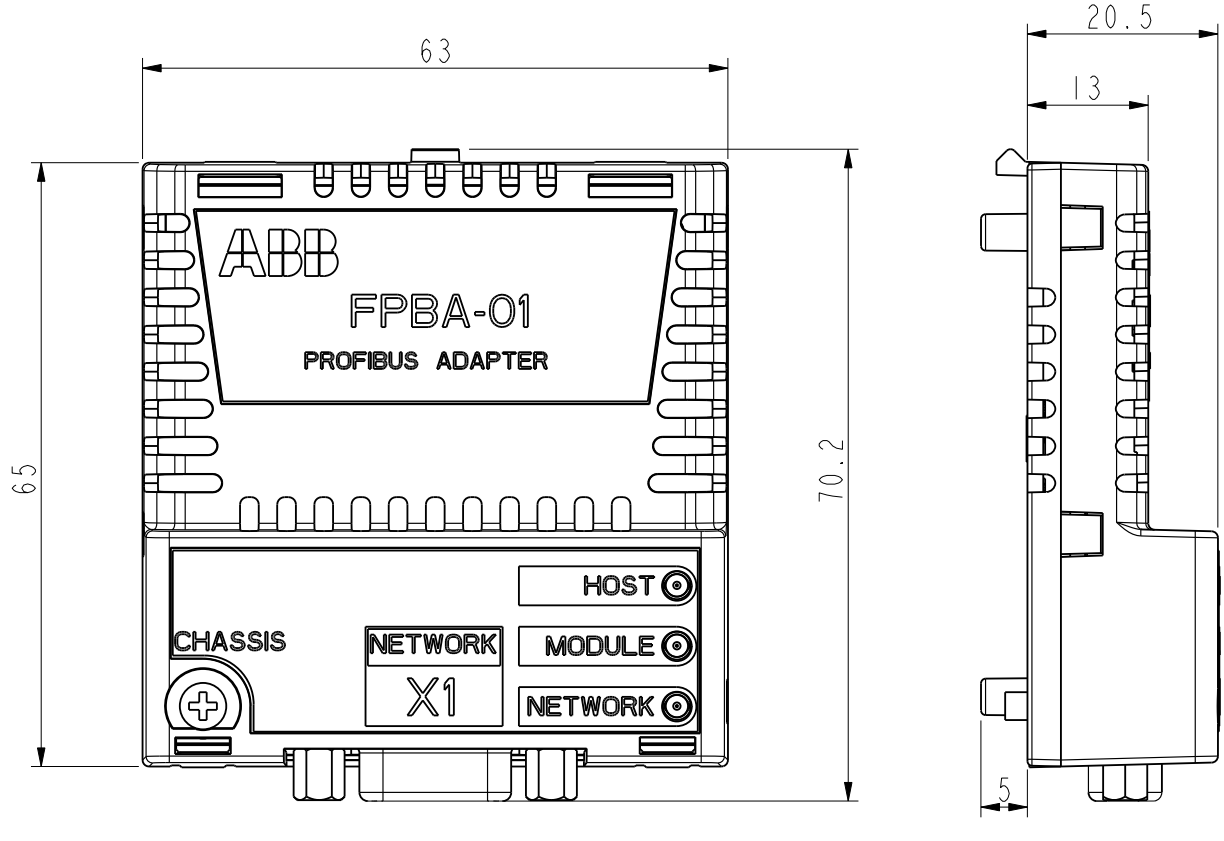
Technical data

What this chapter contains

This chapter contains the technical data of the adapter module and the PROFIBUS link.

FPBA-01

Enclosure:



Mounting: Into the option slot on the drive

Degree of protection: IP20

Ambient conditions: The applicable ambient conditions specified for the drive in its manuals are in effect.

Indicators: Three bicolor LEDs (HOST, MODULE, NETWORK)

Connectors:

- 20-pin connector to drive (X2)
- 9-pin D-SUB connector to bus (X1)

Power supply:

- +3.3 V ±5% max. 450 mA (supplied by the drive)
- Isolated +5 V supply available for bus termination circuitry (X1 pins 5 and 6). 30 mA max.

General:

- Estimated min. lifetime: 100 000 h
- All materials UL/CSA-approved
- Complies with EMC standard EN 61800-3:2004
- Bus interface functionally isolated from drive

PROFIBUS link

Compatible devices: All PROFIBUS-compliant devices

Medium: Shielded twisted pair RS-485 cable (PROFIBUS-approved cable recommended)

- Termination: 220 ohms, or active termination circuitry at each end of trunk cable (termination not built in the FPBA-01 module)
- Specifications:

Parameter	Line A PROFIBUS DP	Line B DIN 19245 Part 1	Unit
Impedance	35…165 (3…20 MHz)	100…130 (f > 100 kHz)	ohm
Capacitance	< 30	< 60	pF/m
Resistance	< 110	–	ohm/km
Wire gauge	> 0.64	> 0.53	mm
Conductor area	> 0.34	> 0.22	mm^2

- Maximum bus length:

Transfer rate (kbit/s)	≤ 93.75	187.5	500	1500	3000	6000	12000
Line A (m)	1200	1000	400	200	100	100	100
Line B (m)	1200	600	200	–	–	–	–

Topology: Trunk line, drop lines allowed. Max. 126 nodes with repeaters (31 nodes + repeater per section)

Transfer rate: 12 Mb/s max., automatically detected by the adapter module

Serial communication type: Asynchronous, half-duplex RS-485

Protocol: PROFIBUS DP

11

Appendix A – PROFIdrive parameters

What this chapter contains

This chapter contains a list of the PROFIdrive profile parameters.

PROFIdrive parameters

Par. no.	R/W[1)]	Data type	Description
915	R/W	Array [10] Unsigned16	Assignment PZD1 to PZD10 in PPO-write
916	R/W	Array [10] Unsigned16	Assignment PZD1 to PZD10 in PPO-read
918	R/W	Unsigned16	Node address. Writing this parameter will change the node address. Module re-start required.
919	R	Octet String4	Device system number.
923	R	Array [n] Unsigned16	List of all parameters for signals. Mandatory if process data normalization is used and/or parameters *915* and *916* are implemented. **Signal no. and name** **Type** 1 – Control word 1 (STW1) Unsigned16

<table>
<tr><th>Par. no.</th><th>R/W[1)]</th><th>Data type</th><th>Description</th></tr>
<tr><td></td><td></td><td></td><td>2 – Status word 1 (ZSW1) Unsigned16
3 – Control word 2 (STW2) Unsigned16
4 – Status word 2 (ZSW2) Unsigned16
5 – Speed set point A (NSOLL_A) Signed16
6 – Speed actual value A (NIST_A) Signed16
7 – Speed set point B (NSOLL_B) Signed32
8 – Speed actual value B (NIST_B) Signed32
27 – Position set point A (XSOLL_A) Signed32
28 – Position actual value A (XIST_A) Signed32
32 – Traversing block selection (SATZANW) (not supported) Unsigned16
33 – Actual traversing block (AKTSATZ) (not supported) Unsigned16
34 – Target position (TARPOS_A) (not supported) Signed32
35 – Velocity (VELOCITY_A) Unsigned32
101…9999 – Drive-specific –</td></tr>
<tr><td>927</td><td>R/W</td><td>Unsigned16</td><td>Operator control rights (parameter identification, PKW)
Value Mode
0 Parameters cannot be written, only read (927 can be written).
1 Parameters can be written and read (default).</td></tr>
</table>

Par. no.	R/W[1)]	Data type	Description
928	R/W	Unsigned16	Control rights (process data, PZD). **Value** **Mode** 0 PZD part is disabled, ie, Receipt of new PZD data is ignored. 1 PZD part is enabled (default).
929	R	Unsigned16	Selected PPO type **Value** **PPO type** **Configuration** 1 PPO1 F3h, F1h 2 PPO2 F3h, F5h 3 PPO3 F1h 4 PPO4 F5h 5 PPO5 F3h, F9h 6 PPO6 F9h 7 PPO7 0xF3, 0xFB 8 PPO8 0xFB **Note:** This parameter is not available if standard telegram ST1 or ST2 is selected.
930	R/W	Unsigned16	Selection switch for communication profile. **Value** **Mode** 1 PROFIdrive 8001h ABB Drives 8002h Transparent 16 8003h Transparent 32 8004h PROFIdrive positioning mode

Par. no.	R/W[1)]	Data type	Description
933	R/W	Unsigned16	Selection switch for Control word, bit 11. **Value** **Module Control word bit** 0 None 1 to 5 Vendor-specific 1 to 5[2)]
934	R/W	Unsigned16	Selection switch for Control word, bit 12. (See parameter *933* for coding.)
935	R/W	Unsigned16	Selection switch for Control word, bit 13. (See parameter *933* for coding.)
936	R/W	Unsigned16	Selection switch for Control word, bit 14. (See parameter *933* for coding.)
937	R/W	Unsigned16	Selection switch for Control word, bit 15. (See parameter *933* for coding.)
939	R/W	Unsigned16	Selection switch for Status word, bit 11. **Value** **Module Status word bit** 0 None 1 to 4 Vendor-specific 1 to 4[2)]
940	R/W	Unsigned16	Selection switch for Status word, bit 12. (See parameter *939* for coding.)
941	R/W	Unsigned16	Selection switch for Status word, bit 13. (See parameter *939* for coding.)
942	R/W	Unsigned16	Selection switch for Status word, bit 14. (See parameter *939* for coding)
943	R/W	Unsigned16	Selection switch for Status word, bit 15. (See parameter *939* for coding.)
945	R	Array[64] Unsigned16	Fault code (coded according to DRIVECOM profile). Supported with ACS355 drives only. **Note:** The drive may limit the actual number of the faults recorded. **Subindex** **Contents** 1 Active fault

Par. no.	R/W[1)]	Data type	Description
947	R	Array [64] Unsigned16	Fault number. **Subindex Contents** See parameter *945*.
952	R/W	Unsigned16	Number of faults occurred. Writing a zero clears the value.
953	R	Unsigned16	[3)] Last alarm
954	R	Unsigned16	[3)] Second last alarm
955	R	Unsigned16	[3)] Third last alarm
956	R	Unsigned16	[3)] Fourth last alarm
957	R	Unsigned16	[3)] Fifth last alarm
958	R	Unsigned16	Sixth last alarm (not supported)
959	R	Unsigned16	Seventh last alarm (not supported)
960	R	Unsigned16	Eighth last alarm (not supported)
961	R	Octet String4	Hardware configuration (manufacturer-specific ID of the drive)
963	R	Unsigned16	Detected baud rate: **0** = 9.6 kbit/s **1** = 19.2 kbit/s **2** = 93.75 kbit/s **3** = 187.5 kbit/s **4** = 500 kbit/s **6** = 1.5 Mbit/s **7** = 3 Mbit/s **8** = 6 Mbit/s **9** = 12 Mbit/s **11** = 45.45 kbit/s **255** = Invalid baud rate

Par. no.	R/W[1)]	Data type	Description
964	R	Array [7] Unsigned16	**Subindex** **Contents** 0 Manufacturer 1 Device type 2 Version 3 Firmware date (year) 4 Firmware date (day/month) 5 Number of Axes 6 Identification (**0959h**)
965	R	Octet String2	Profile number of this device. Eg: 0302h = Profile 3, Version 2
967	R	Unsigned16	Control word (CW)
968	R	Unsigned16	Status word (SW)
970	R/W	Unsigned16	Load parameter record **Value** **Description** 0 No action 1 Restore factory settings The parameter must do a zero-to-one transition and the motor must be stopped.
971	R/W	Unsigned16	Save parameter record **Value** **Description** 0 No action 1 Save the drive parameters to non-volatile memory The parameter must do a zero-to-one transition and the motor must be stopped.

Par. no.	R/W[1)]	Data type	Description
972	R/W	Unsigned16	Software reset **Value** **Description** 0 No action 1 Re-boot PROFIBUS module The parameter must do a zero-to-one transition and the motor must be stopped.
975	R	Array[n] Unsigned16	DO identification. For subindexes 0…4, see parameter *964*. **Subindex** **Meaning** 5 Value 2 = Axis 6 Bit 0=1 -> Application Class 1 supported Bit 2=1 -> Application Class 3 supported
980 981	R	Array[n] Unsigned16	Number list of the defined parameters. If the subindex is 0, the end of the list has been reached. If the subindex is the number of the next list parameter, the list is continued there.

1) Read and/or Write
2) The meaning of vendor-specific bits is defined by the drive application program.
3) Support depends on the drive type.

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Appendix B – I&M records

What this chapter contains

This chapter contains the telegram and response structures for I&M (Identification & Maintenance) records.

I&M records

I&M records can be read, for example, with the DTM tool. The FPBA-01 module supports the mandatory I&M0 record as well as the optional I&M1 and I&M2 records.

Call-REQ-PDU telegram for read/write access to I&M records

	Contents	Size	Coding	Notes
DP-V1 header	Function_Num	1 Octet	5Fh	fixed
	Slot_Number	1 Octet	0…255	variable
	Index	1 Octet	255	fixed
	Length	1 Octet	4 / 68	Call Header only / Write
Call Header	Extended_Function_ Num	1 Octet	08h	Indicates “Call”, fixed
	reserved	1 Octet	00h	fixed
	FI_Index	2 Octets	65000…	Subindex of I&M0 Record 65000 = I&M0 65001 = I&M1 65002 = I&M2
	IM_Function	64 Octets	Data	Write only (I&M1 or I&M2)

Response structure for I&M0 (Read-only)

	Contents	Size	Coding
Header	Manufacturer-specific	10 Octets	“FPBA-01”
I&M block	MANUFACTURER_ID	2 Octets	0x1A = ABB Automation
	ORDER_ID	20 Octets	“68469325” (for FPBA-01 kit)
	SERIAL_NUMBER	16 Octets	Serial number of FPBA module
	HARDWARE_REVISION	2 Octets	Hardware version of FPBA module
	SOFTWARE_REVISION	4 Octets	Format: **V255.255.255** Eg, V1.0.0 = software version 1.00
	REVISION_COUNTER	2 Octets	(Marks a change of hardware or its parameters)
	PROFILE_ID	2 Octets	3A00 (…3AFF) PROFIdrive
	PROFILE_SPECIFIC_ TYPE	2 Octets	0 = no specific type
	IM_VERSION	2 Octets	0x0101 = version 1.1
	IM_SUPPORTED	2 Octets	3 = I&M0, I&M1 and I&M2 supported

Response structure for I&M1 (Read/Write)

	Contents	Size	Coding
Header	Manufacturer-specific	10 Octets	–
I&M0 block	TAG_FUNCTION	32 Octets	Device function or task
	TAG_LOCATION	22 Octets	Device location

Response structure for I&M2 (Read/Write)

	Contents	Size	Coding
Header	Manufacturer-specific	10 Octets	–
I&M0 block	INSTALLATION_DATE	16 Octets	Installation date. Eg, **2011-01-01 16:23**
	RESERVED	38 Octets	Reserved

Note: I&M1 and I&M2 are blank (0x20) by default.

Further information

Product and service inquiries

Address any inquiries about the product to your local ABB representative, quoting the type designation and serial number of the unit in question. A listing of ABB sales, support and service contacts can be found by navigating to www.abb.com/drives and selecting *Sales, Support and Service network*.

Product training

For information on ABB product training, navigate to www.abb.com/drives and select *Training courses*.

Providing feedback on ABB Drives manuals

Your comments on our manuals are welcome. Go to www.abb.com/drives and select *Document Library – Manuals feedback form (LV AC drives)*.

Document library on the Internet

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Contact us

ABB Oy
Drives
P.O. Box 184
FI-00381 HELSINKI
FINLAND
Telephone +358 10 22 11
Fax +358 10 22 22681
www.abb.com/drives

ABB Inc.
Automation Technologies
Drives & Motors
16250 West Glendale Drive
New Berlin, WI 53151
USA
Telephone 262 785-3200
1-800-HELP-365
Fax 262 780-5135
www.abb.com/drives

ABB Beijing Drive Systems Co. Ltd.
No. 1, Block D,
A-10 Jiuxianqiao Beilu
Chaoyang District
Beijing, P.R. China, 100015
Telephone +86 10 5821 7788
Fax +86 10 5821 7618
www.abb.com/drives

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